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1.0 GENERAL

1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

- U.S. ARMY CORPS OF ENGINEERS (USACE) ER 1-1-11 (1995) Progress, Schedules, and Network Analysis Systems <http://www.usace.army.mil/publications/eng-regs/er1-1-11/entire.pdf>

1.2. QUALIFICATIONS

Designate an authorized representative who shall be responsible for the preparation of the schedule and all required updating (statusing) and preparation of reports. The authorized representative shall be experienced in scheduling projects similar in nature to this project and shall be experienced in the use of the scheduling software that meets the requirements of this specification.

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

3.1.1. Submit a project schedule as specified herein for approval showing the sequence in which the Contractor proposes to perform the work and dates on which the Contractor contemplates starting and completing all schedule activities. The scheduling of the entire project, including the design and construction sequences is required. Contractor management personnel shall actively participate in its development. Designers, subcontractors and suppliers working on the project shall also contribute in developing an accurate project schedule. The schedule must be a forward planning as well as a project monitoring tool. The approved project schedule shall be used to measure the progress of the work and to aid in evaluating requests for excusable time extensions. The schedule shall be cost loaded and activity coded as specified herein. The schedule will provide the basis for all progress payments. If the Contractor fails to submit any schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments until the Contractor submits the required schedule

3.1.2. Status the schedule on at least a monthly basis, as specified herein. If in the opinion of the Contracting Officer, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress including those that may be required by the Contracting Officer, without additional cost to the Government. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules as the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained. See paragraph 3.7.4.

3.1.3. Failure of the Contractor to comply with the requirements of the Contracting Officer shall be grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of the contract.

3.2. BASIS FOR PAYMENT AND COST LOADING

The schedule shall be the basis for determining contract earnings during each update period and therefore the amount of each progress payment. Lack of an approved schedule update or qualified scheduling personnel will result in an inability of the Contracting Officer to evaluate contract earned value for the purposes of payment. Failure of the Contractor to provide all information, as specified herein will result in the disapproval of the preliminary, initial and subsequent schedule updates. In the event schedule revisions are directed by the Contracting Officer and those revisions have not been included in subsequent revisions or updates, the Contracting Officer may hold retainage up to the maximum allowed by contract, each payment period, until such revisions to the project schedule have been made. Activity cost loading shall be reasonable as determined by the Contracting Officer. The aggregate value of all activities coded to a contract CLIN as specified herein shall equal the value of the CLIN on the Schedule.

3.3. PROJECT SCHEDULE DETAILED REQUIREMENTS

The computer software system utilized to produce and update the project schedule shall be capable of meeting all requirements of this specification. Failure of the Contractor to meet the requirements of this specification will result in the disapproval of the schedule. Scheduling software that meets the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER-1-1-11(1995) referenced herein are Primavera Project Planner (P3) by Primavera, and Open Plan by Deltek.

3.3.1. Use of the Critical Path Method

Use the Critical Path Method (CPM) of network calculation to generate the project schedule. Prepare the project schedule using the Precedence Diagram Method (PDM).

3.3.2. Level of Detail Required

Develop the project schedule to an appropriate level of detail. Failure to develop the project schedule to an appropriate level of detail, as determined by the Contracting Officer, will result in its disapproval. The Contracting Officer will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail:

3.3.2.1. Activity Durations

Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods. Less than 2 percent of all non-procurement activities shall have Original Durations (OD) greater than 20 work days or 30 calendar days. Procurement activities are defined herein.

3.3.2.2. Design and Permit Activities

Include design and permit activities, including necessary conferences and follow-up actions and design package submission activities. Include the design schedule in the project schedule, showing the sequence of events involved in carrying out the project design tasks within the specific contract period. This shall be at a detailed level of scheduling sufficient to identify all major design tasks, including those that control the flow of work. Include review and correction periods associated with each item.

3.3.2.3. Procurement Activities

Include activities associated with the submittal, approval, procurement, fabrication and delivery of long lead materials, equipment, fabricated assemblies and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days. A typical procurement sequence includes the string of activities: submit, approve/review, procure, fabricate, and deliver.

3.3.2.4. Mandatory Tasks

Include and properly schedule the following tasks (See also the Sample Preliminary Submittal Register Input Form):

- 3.3.2.4.1. Submission, review and acceptance of design packages, including BIM
- 3.3.2.4.2. Submission of mechanical/electrical/information systems layout drawings
- 3.3.2.4.3. Submission and approval of O & M manuals
- 3.3.2.4.4. Submission and approval of as-built drawings
- 3.3.2.4.5. Submission and approval of 1354 data and installed equipment lists
- 3.3.2.4.6. Submission and approval of testing and air balance (TAB)
- 3.3.2.4.7. Submission of TAB specialist design review report

3.3.2.4.8. Submission and approval of fire protection specialist

3.3.2.4.9. Submission and approval of testing and balancing of HVAC plus commissioning plans and data. Develop the schedule logic associated with testing and commissioning of mechanical systems to a level of detail consistent with the contract commissioning requirements.

3.3.2.4.10. Air and water balancing

3.3.2.4.11. HVAC commissioning

3.3.2.4.12. Controls testing plan submission

3.3.2.4.13. Controls testing

3.3.2.4.14. Performance Verification testing

3.3.2.4.15. Other systems testing, if required

3.3.2.4.16. Contractor's pre-final inspection

3.3.2.4.17. Correction of punch list from Contractor's pre-final inspection

3.3.2.4.18. Government's pre-final inspection

3.3.2.4.19. Correction of punch list from Government's pre-final inspection

3.3.2.4.20. Final Inspection

3.3.2.5. Government Activities. Show Government and other agency activities that could impact progress. These activities include but are not limited to: approvals, design reviews, review conferences, release for construction of design package(s), environmental permit approvals by State regulators, inspections, utility tie-ins, Government Furnished Property/Equipment (GFP) and Notice to Proceed for phasing requirements, if any.

3.3.2.6. Activity Responsibility Coding (RESP)

Assign Responsibility Code for all activities to the Prime Contractor, Subcontractor or Government agency responsible for performing the activity. Activities coded with a Government Responsibility code include, but are not limited to: Government approvals, Government design reviews, environmental permit approvals by State regulators, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements. Code all activities not coded with a Government Responsibility Code to the Prime Contractor or Subcontractor responsible to perform the work. Activities shall not have more than one Responsibility Code. Examples of acceptable activity code values are: DOR (for the designer of record); ELEC (for the electrical subcontractor); MECH (for the mechanical subcontractor); and GOVT (for USACE). Unacceptable code values are abbreviations of the names of subcontractors.

3.3.2.7. Activity Work Area Coding (AREA)

Assign Work Area code to activities based upon the work area in which the activity occurs. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew from working in more than one work area at a time due to restraints on resources or space. Examples of Work Area Coding include different areas within a floor of a building, different floors within a building, and different buildings within a complex of buildings. Activities shall not have more than one Work Area Code. Not all activities are required to be Work Area coded. A lack of Work Area coding will indicate the activity is not resource or space constrained.

3.3.2.8. Contract Changes/Requests for Equitable Adjustment (REA) Coding (MODF)

Assign Activity code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by Contracting Officer, with a Contract Changes/REA Code. Key all Code values to

the Government's modification numbering system. Any activity or sequence of activities added to the schedule as a result of alleged constructive changes made by the Government may be added to a copy of the current schedule, subject to the approval of the Contracting Officer. Assign Activity codes for these activities with a Contract Changes/REA Code. Key the code values to the Contractor's numbering system. Approval to add these activities does not necessarily mean the Government accepts responsibility and therefore liability for such activities and any associated impacts to the schedule, but rather the Government recognizes such activities are appropriately added to the schedule for the purposes of maintaining a realistic and meaningful schedule. Such activities shall not be Responsibility Coded to the Government unless approved. An activity shall not have more than one Contract Changes/REA Code

3.3.2.9. Contract Line Item (CLIN) Coding (BIDI)

Code all activities to the CLIN on the Contract Line Item Schedule to which the activity belongs. An activity shall not contain more than one CLIN Item Code. CLIN Item code all activities, even when an activity is not cost loaded.

3.3.2.10. Phase of Work Coding (PHAS)

Assign Phase of Work Code to all activities, based upon the phase of work in which the activity occurs. Code activities to either a Design Phase or a Construction Phase. Code fast track design and construction phases proposed by the Contractor to allow filtering and organizing the schedule by fast track design and construction packages. If the contract specifies construction phasing with separately defined performance periods, identify a Construction Phase Code to allow filtering and organizing the schedule accordingly. Each activity shall have only one Phase of Work code.

3.3.2.11. Category of Work Coding (CATW)

Assign Category of Work code to all Activities based upon the category of work which the activity belongs. Category of Work Code must include, but is not limited to: Design, Design Submittal, design reviews, review conferences, Construction Submittal, Approvals (if any), Acceptance, Procurement, Fabrication, Delivery, Weather Sensitive Installation, Non-Weather Sensitive Installation, Start Up, Test, and Turnover. Assign a Category of Work code to each activity. Each activity shall have only one Category of Work Code.

3.3.2.12. Definable Features of Work Coding (FOW1, FOW2, FOW3)

Assign a Definable Feature of Work Code to appropriate activities based on the definable feature of work to which the activity belongs. Definable Feature of Work is defined in Specification Section 01 45 04.00 10, Contractor Quality Control. An activity shall not have more than one Definable Feature of Work Code. Not all activities are required to be Definable Feature of Work Coded.

3.3.3. Scheduled Project Completion and Activity Calendars

The schedule interval shall extend from NTP date to the required contract completion date. The contract completion activity (End Project) shall finish based on the required contract duration, as adjusted for any approved contract time extensions. The first scheduled work period shall be the day after NTP is acknowledged by the Contractor. Schedule activities on a calendar to which the activity logically belongs. Activities may be assigned to a 7 day calendar when the contract assigns calendar day durations for the activity such as a Government Acceptance activity. If the Contractor intends to perform physical work less than seven days per week, schedule the associated activities on a calendar with non-work periods identified including weekends and holidays. Assign the Category of Work Code - Weather Sensitive Installation to those activities that are weather sensitive. Original durations must account for anticipated normal adverse weather. The Government will interpret all work periods not identified as non-work periods on each calendar as meaning the Contractor intends to perform work during those periods.

3.3.3.1. Project Start Date

The schedule shall start no earlier than the date on which the NTP was acknowledged. Include as the first activity in the project schedule an activity called "Start Project" or "NTP". The "Start Project" activity shall have an "ES" constraint date equal to the date that the NTP was acknowledged, with a zero day duration.

3.3.3.2. Schedule Constraints and Open Ended Logic

Constrain completion of the last activity in the schedule by the contract completion date. Schedule calculations shall result in negative float when the calculated early finish date of the last activity is later than the contract completion date. Include as the last activity in the project schedule an activity called "End Project". The "End Project" activity shall have an "LF" constraint date equal to the contract completion date for the project, and with a zero day duration or by using the "project must finish by" date in the scheduling software. The schedule shall have no constrained dates other than those specified in the contract. The use of artificial float constraints such as "zero fee float" or "zero total float" are typically prohibited. There shall only be 2 open ended activities: Start Project (or NTP) with no predecessor logic and End Project with no successor logic.

3.3.3.3. Early Project Completion

In the event the Preliminary or Initial project schedule calculates an early completion date of the last activity prior to the contract completion date, the Contractor shall identify those activities that it intends to accelerate and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. The last activity shall have a late finish constraint equal to the contract completion date and the schedule will calculate positive float. The Government will not approve an early completion schedule with zero float on the longest path. The Government is under no obligation to accelerate activities for which it is responsible to support a proposed early contract completion.

3.3.4. Interim Completion Dates

Constrain contractually specified interim completion dates to show negative float when the calculated early finish date of the last activity in that phase is later than the specified interim completion date.

3.3.4.1. Start Phase

Include as the first activity for a project phase an activity called "Start Phase X" where "X" refers to the phase of work. The "Start Phase X" activity shall have an "ES" constraint date equal to the date on which the NTP was acknowledged, and a zero day duration.

3.3.4.2. End Phase

Include as the last activity for a project phase an activity called "End Phase X" where "X" refers to the phase of work. The "End Phase X" activity shall have an "LF" constraint date equal to the specified completion date for that phase and a zero day duration.

3.3.4.3. Phase "X" Hammock

Include a hammock type activity for each project phase called "Phase X" where "X" refers to the phase of work. The "Phase X" hammock activity shall be logically tied to the earliest and latest activities in the phase.

3.3.5. Default Progress Data Disallowed

Do not automatically update Actual Start and Finish dates with default mechanisms that may be included in the scheduling software. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process shall match those dates provided from Contractor Quality Control Reports. Failure of the Contractor to document the AS and AF dates on the Daily Quality Control report for every in-progress or completed activity, and failure to ensure that the data contained on the Daily Quality Control reports is the sole basis for schedule updating shall result in the disapproval of the Contractor's updated schedule and the inability of the Contracting Officer to evaluate Contractor progress for payment purposes. Updating of the percent complete and the remaining duration of any activity shall be independent functions. Disable program features which calculate one of these parameters from the other.

3.3.6. Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the Contracting Officer. Propose logic corrections to eliminate all out of sequence progress or justify not changing the sequencing for approval prior to submitting an

updated project schedule. Correct out of sequence progress that continues for more than two update cycles by logic revision, as approved by the Contracting Officer.

3.3.7. Negative Lags and Start to Finish Relationships

Lag durations contained in the project schedule shall not have a negative value. Do not use Start to Finish relationships (SF).

3.3.8. Calculation Mode

Schedule calculations shall retain the logic between predecessors and successors even when the successor activity starts and the predecessor activity has not finished. Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") will not be allowed.

3.3.9. Milestones

Include milestone activities for each significant project event including but not limited to: milestone activities for each fast track design package released for construction; design complete; foundation/substructure construction complete; superstructure construction complete; building dry-in or enclosure complete to allow the initiation of finish activities; permanent power complete; and building systems commissioning complete.

3.4. PROJECT SCHEDULE SUBMISSIONS

Provide the submissions as described below. The data CD, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS.

3.4.1. Preliminary Project Schedule Submission

Submit the Preliminary Project Schedule, defining the Contractor's planned operations for the first 90 calendar days for approval within 15 calendar days after the NTP is acknowledged. The approved Preliminary Project Schedule will be used for payment purposes not to exceed 90 calendar days after NTP. Completely cost load the Preliminary Project Schedule to balance the contract award CLINS shown on the Price Schedule. Detail it for the first 90 calendar days. It may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as previously specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all of the required Plan and Program preparations, submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan) as well as design activities, the planned submissions of all early design packages, permitting activities, design review conference activities and other non-construction activities intended to occur within the first 90 calendar days. Schedule any construction activities planned for the first 90 calendar days after NTP. Constrain planned construction activities by Government acceptance of the associated design package(s) and all other specified Program and Plan approvals. Activity code any activities that are summary in nature after the first 90 calendar days with Responsibility Code (RESP) and Feature of Work code (FOW1, FOW2, FOW3)

3.4.2. Initial Project Schedule Submission

Submit the Initial Project Schedule for approval within 42 calendar days after NTP. The schedule shall demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. The Initial Schedule shall be at a reasonable level of detail as determined by the Contracting Officer. Include detailed design and permitting activities, including but not limited to identification of individual design packages, design submission, reviews and conferences; permit submissions and any required Government actions; and long lead procurement activities required prior to design completion. The Initial Project Schedule shall include the entire construction sequence and all fast track construction activities, with as much detail as is known at the time but, as a minimum, shall include all construction start and completion milestone activities, and detailed construction activities through the dry-in milestone, including all activity coding and cost loading. Include the remaining construction, including cost loading, but it may be scheduled summary in nature. As the design proceeds and design packages are developed, fully detail the remaining construction activities concurrent with the monthly schedule updating process. Constrain construction activities by Government acceptance of associated

designs. When the design is complete, incorporate into the then approved schedule update all remaining detailed construction activities that are planned to occur after the dry-in milestone.

3.4.3. Design Package Schedule Submission:

With each design package submitted to the Government, submit a frag-net schedule extracted from the then current Preliminary, Initial or Updated schedule which covers the activities associated with that Design Package including construction, procurement and permitting activities.

3.4.4. Periodic Schedule Updates

Based on the result of the meeting specified in PERIODIC SCHEDULE UPDATE MEETINGS, submit periodic schedule updates. These submissions shall enable the Contracting Officer to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgment of the Contracting Officer or authorized representative is necessary for verifying the Contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made. Update the schedule to include detailed lower WBS activities procurement and construction activities as the design progresses, but not later than the submission of the final, un-reviewed design submission for each separate design package. The Contracting Officer may require submission of detailed schedule activities for any distinct construction that is started prior to submission of a final design submission, if such activity is authorized.

3.4.5. Standard Activity Coding Dictionary

Use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11, Appendix A. This exact structure is mandatory, even if some fields are not used. A template SDEF compatible schedule backup file (sdef.prx) is available on the QCS website: www.rmssupport.com. The SDEF format is as follows:

Field	Activity Code	Length	Description
1	WRKP	3	Workers per Day
2	RESP	4	Responsible Party (e.g. GC, subcontractor, USACE)
3	AREA	4	Area of Work
4	MODF	6	Modification or REA number
5	BIDI	6	Bid Item (CLIN)
6	PHAS	2	Phase of Work
7	CATW	1	Category of Work
8	FOW1	10	Feature of Work (used up to 10 characters in length)
9	FOW2	10	Feature of Work (used up to 20 characters in length)
10	FOW3	10	Feature of Work (used up to 30 characters in length)

3.5. SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, and every Periodic Schedule Update throughout the life of the project:

3.5.1. Data CD's

Provide two sets of data CD's containing the project schedule in the backup format. Each CD shall also contain all previous update backup files. File medium shall be CD. Label each CD, indicating the type of schedule (Preliminary, Initial, Update), full contract number, Data Date and file names. Each schedule shall have a unique file name as determined by the Contractor.

3.5.2. Narrative Report

Provide a Narrative Report with the Preliminary, Initial, and each Periodic Update of the project schedule, as the basis of the progress payment request. The Narrative Report shall include: a description of activities along the 2 most critical paths where the total float is less than or equal to 20 work days, a description of current and anticipated problem areas or delaying factors and their impact, and an explanation of corrective actions taken or required to be taken. The narrative report is expected to communicate to the Government, the Contractor's thorough analysis of the schedule output and its plans to compensate for any problems, either current or potential, which are revealed through its analysis. Identify and explain why any activities that, based their calculated late dates, should have either started or finished during the update period but did not.

3.5.3. Approved Changes Verification

Include only those project schedule changes in the schedule submission that have been previously approved by the Contracting Officer. The Narrative Report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

3.5.4. Schedule Reports

The format, filtering, organizing and sorting for each schedule report shall be as directed by the Contracting Officer. Typically reports shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. The following lists typical reports that will be requested. One or all of these reports may be requested for each schedule submission.

3.5.4.1. Activity Report

A list of all activities sorted according to activity number.

3.5.4.2. Logic Report

A list of detailed predecessor and successor activities for every activity in ascending order sorted by activity number.

3.5.4.3. Total Float Report

A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in ascending order of Early Start Dates. Do not show completed activities on this report.

3.5.4.4. Earnings Report by CLIN

A compilation of the Contractor's Total Earnings on the project from the NTP to the data date. This report shall reflect the earnings of specific activities based on the agreements made in the schedule update meeting defined herein. Provided that the Contractor has provided a complete schedule update, this report shall serve as the basis of determining progress payments. Group activities by CLIN Item number and sort by activity number. This report shall: sum all activities coded to a particular CLIN and provide a CLIN Item percent earned value; and complete and sum CLIN items to provide a total project percent complete. The printed report shall contain, for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Quantity to Date, Percent Complete (based on cost), and Earnings to Date.

3.5.5. Network Diagram

The network diagram is required for the Preliminary, Initial and Periodic Updates. Depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.5.5.1. Continuous Flow

Show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

3.5.5.2. Project Milestone Dates

Show dates on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

3.5.5.3. Critical Path

Clearly show the critical path.

3.5.5.4. Banding

Organize activities as directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

3.5.5.5. S-Curves

Earnings curves showing projected early and late earnings and earnings to date.

3.6. PERIODIC SCHEDULE UPDATE MEETINGS

Conduct periodic schedule update meetings for the purposes of reviewing the Contractor's proposed out of sequence corrections, determining causes for delay, correcting logic, maintaining schedule accuracy and determining earned value. Meetings shall occur at least monthly within five days of the proposed schedule data date and after the Contractor has updated the schedule with Government concurrence respecting actual start dates, actual finish dates, remaining durations and percent complete for each activity it intend to status. Match the actual start and finish dates with the dates exported, as described in paragraph 3.3.5. Provide a computer with the scheduling software loaded and a projector during the meeting which allows all meeting participants to view the proposed schedule update during the meeting. The meeting and resultant approvable schedule update shall be a condition precedent to a formal submission of the update as described in SUBMISSION REQUIREMENTS and to the submission of an invoice for payment. The meeting will be a working interactive exchange which will allow the Government and the Contractor the opportunity review the updated schedule on a real time and interactive basis. The Contractor's authorized scheduling representative will organize, sort, filter and schedule the update as requested by the Government. The meeting will last no longer than 8 hours. A rough draft of the proposed activity logic corrections and narrative report shall be provided to the Government 48 hours in advance of the meeting. The Contractor's Project Manager and Authorized Scheduler shall attend the meeting with the Authorized Representative of the Contracting Officer.

3.6.1. Update Submission Following Progress Meeting

Submit a complete update of the project schedule containing all approved progress, revisions, and adjustments, pursuant to paragraph SUBMISSION REQUIREMENTS not later than 4 working days after the periodic schedule update meeting, reflecting only those changes made during the previous update meeting.

3.6.2. Status of Activities

Update status information, including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD) and Percent Complete shall be subject to the approval of the Government prior to the meeting. As a minimum, address the following items on an activity by activity basis during each progress meeting:

3.6.2.1. Actual Start and Finish Dates

Accurately status the AS and/or AF dates for each activity currently in-progress or completed since the last update. The Government may allow an AF date to be assigned with the percent complete less than 100% to account for the value of work remaining but not restraining successor activities. Only assign AS dates when actual progress occurs on an activity.

3.6.2.2. Remaining Duration

Update the estimated RD for all incomplete activities independent of Percent Complete. Remaining durations may exceed the activity OD or may exceed the activity's prior update RD if the Government considers the current OD or RD to be understated based on current progress, insufficient work crews actually manning the job, unrealistic OD or deficiencies that must be corrected that restrain successor activities.

3.6.2.3. Percent Complete

Update the percent complete for each activity started, based on the realistic assessment of earned value. Activities which are complete but for remaining minor punch list work and which do not restrain the initiation of successor activities may be statused 100 percent complete. To allow for proper schedule management, cost load the correction of punch list from Government pre-final inspection activity(ies) not less than 1% of the total contract value, which activity(ies) may be declared 100 percent complete upon completion and correction of all punch list work identified during Government pre-final inspection(s).

3.6.2.4. Logic Changes

Specifically identify and discuss all logic changes pertaining to NTP on change orders, change orders to be incorporated into the schedule, contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, and other changes that have been made pursuant to contract provisions. The Government will only approve logic revisions for the purpose of keeping the schedule valid in terms of its usefulness in calculating a realistic completion date, correcting erroneous logic ties, and accurately sequencing the work.

3.6.2.5. Other Changes

Other changes required due to delays in completion of any activity or group of activities include: 1) delays beyond the Contractor's control, such as strikes and unusual weather. 2) delays encountered due to submittals, Government Activities, deliveries or work stoppages which make re-planning the work necessary. 3) Changes required to correct a schedule that does not represent the actual or planned prosecution and progress of the work.

3.7. REQUESTS FOR TIME EXTENSIONS

In the event the Contractor believes it is entitled to an extension of the contract performance period, completion date, or any interim milestone date, furnish the following for a determination by the Contracting Officer: justification, project schedule data, and supporting evidence as the Contracting Officer may deem necessary. Submission of proof of excusable delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is a condition precedent to any approvals by the Government. In response to each Request For Proposal issued by the Government, the Contractor shall submit a schedule impact analysis demonstrating whether or not the change contemplated by the Government impacts the critical path.

3.7.1. Justification of Delay

The project schedule shall clearly display that the Contractor has used, in full, all the float time available for the work involved with its request. The Contracting Officer's determination as to the number of allowable days of contract extension shall be based upon the project schedule updates in effect for the time period in question, and other factual information.

Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay, will not be a cause for an extension to the performance period, completion date, or any interim milestone date.

3.7.2. Submission Requirements

Submit a justification for each request for a change in the contract completion date of less than 2 weeks based upon the most recent schedule update at the time of the NTP or constructive direction issued for the change. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

3.7.2.1. A list of affected activities, with their associated project schedule activity number.

3.7.2.2. A brief explanation of the causes of the change

3.7.2.3. An analysis of the overall impact of the changes proposed.

3.7.2.4. A sub-network of the affected area

Identify activities impacted in each justification for change by a unique activity code contained in the required data file.

3.7.3. Additional Submission Requirements

The Contracting Officer may request an interim update with revised activities for any requested time extension of over 2 weeks. Provide this disk within 4 days of the Contracting Officer's request.

3.7.4. If Progress Falls Behind the Approved Project Schedule

3.7.4.1. Should progress fall behind the approved schedule (more than 20 work days of negative float) due to Contractor generated problems, promptly provide a supplemental recovery or completion schedule that illustrates its efforts to regain time to assure a completion by the required contract completion date.

3.7.4.2. The supplemental recovery or completion schedule will not replace the original, approved schedule as the official contract schedule. Continue to update the original, approved schedule on at least a monthly basis. In addition, the Contractor and the Contracting Officer will monitor the supplemental recovery or completion schedule on at least a bi-weekly basis to determine its effect on regaining the rate of progress to assure project completion by the contractually required completion date.

3.7.4.3. Do not artificially improve progress by simply revising the schedule logic, modifying or adding constraints, or shortening future work activity durations. Resource and manpower load the supplemental recovery schedule or completion schedule with crew size and productivity for each remaining activity, indicating overtime, weekend work, and/or double shifts needed to regain the schedule, in accordance with FAR 52.236.15, without additional cost to the Government. Indicate assumptions made and the basis for any logic, constraint, or duration changes used in the creation of the supplemental recovery or completion schedule in a narrative submitted for the Contracting Officer's approval. Any additional resources or manpower must be evident at the work site. Do not modify the official contract schedule to include these assumptions.

3.7.4.4. Failure to perform work and maintain progress in accordance with the supplemental recovery or completion schedule may result in an interim and final unsatisfactory performance rating and/or may result in corrective action by the Contracting Officer in accordance with FAR 52.236-15.

3.8. DIRECTED CHANGES

If the NTP is issued for changes prior to settlement of price and/or time, submit proposed schedule revisions to the Contracting Officer within 2 weeks of the NTP being issued. The Contracting Officer will approve proposed revisions to the schedule prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the Contracting Officer may furnish the Contractor with suggested revisions to the project schedule. The Contractor shall include these revisions in the project schedule until revisions are submitted and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the Contracting Officer, advise the Contracting Officer within 2 weeks of receipt of the revisions. Regardless of the objections, the Contractor shall continue to update the schedule with the Contracting Officer's revisions until a mutual agreement in the revisions is reached. If the Contractor fails to submit alternative revisions within 2 weeks of

receipt of the Contracting Officer's proposed revisions, the Contractor will be deemed to have concurred with the Contracting Officer's proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work.

3.9. WEEKLY PROGRESS MEETINGS

3.9.1. The Government and the Contractor shall meet weekly (or as otherwise mutually agreed to) between the meetings described in paragraph PERIODIC SCHEDULE UPDATE MEETINGS for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two weeks. The then current and approved schedule update shall be used for the purposes of this meeting and for the production and review of reports. The Contractor's Project Manager and the Authorized Representative of the Contracting Officer shall attend. The weekly progress meeting will address the status of RFI's, RFP's and Submittals.

3.9.2. Provide a bar chart produced by the scheduling software, organized by Total Float and Sorted by Early Start Date, and a two week "look-ahead" schedule by filtering all schedule activities to show only current ongoing activities and activities schedule to start during the upcoming two weeks, organized by Work Area Code (AREA) and sorted by Early Start Date.

3.9.3. The Government and the Contractor shall jointly review the reports. If it appears that activities on the longest path(s) which are currently driving the calculated completion date (driving activities), are not progressing satisfactorily and therefore could jeopardize timely project completion, corrective action must be taken immediately. Corrective action includes but is not limited to: increasing the number of work crews; increasing the number of work shifts; increasing the number of hours worked per shift; and determining if Government responsibility coded activities require Government corrective action.

3.10. OWNERSHIP OF FLOAT

Float available in the schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor.

3.11. TRANSFER OF SCHEDULE DATA INTO RMS/QCS

Download and upload the schedule data into the Resident Management System (RMS) prior to RMS databases being transferred to the Government and is considered to be additional supporting data in a form and detail required by the Contracting Officer pursuant to FAR 52.232-5 - Payments under Fixed-Price Construction Contracts. The receipt of a proper payment request pursuant to FAR 52.232-27 - Prompt Payment for Construction Contracts is contingent upon the Government receiving both acceptable and approvable hard copies and electronic export from QCS of the application for progress payment.

End of Section 01 32 01.00 10

**SECTION 01 33 00
SUBMITTAL PROCEDURES**

1.0 GENERAL

- 1.1. DEFINITIONS
- 1.2. NOT USED
- 1.3. SUBMITTAL CLASSIFICATION
- 1.4. APPROVED OR CONCURRED WITH SUBMITTALS
- 1.5. DISAPPROVED SUBMITTALS
- 1.6. WITHHOLDING OF PAYMENT
- 1.7. GENERAL
- 1.8. SUBMITTAL REGISTER
- 1.9. SCHEDULING
- 1.10. TRANSMITTAL FORM (ENG FORM 4025)
- 1.11. SUBMITTAL PROCEDURES
- 1.12. CONTROL OF SUBMITTALS
- 1.13. GOVERNMENT APPROVED SUBMITTALS
- 1.14. INFORMATION ONLY SUBMITTALS
- 1.15. STAMPS

1.0 GENERAL

1.1. DEFINITIONS

1.1.1. Submittal

Contract Clauses "FAR 52.236-5, Material and Workmanship," paragraph (b) and "FAR 52.236-21, Specifications and Drawings for Construction," paragraphs (d), (e), and (f) apply to all "submittals."

1.1.2. Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by SD numbers and titles as follows.

SD-01 Preconstruction Submittals

- Certificates of insurance.
- Surety bonds.
- List of proposed subcontractors.
- List of proposed products.
- Construction Progress Schedule.
- Submittal register.
- Schedule of prices.
- Accident Prevention Plan.
- Work plan.
- Quality control plan.
- Environmental protection plan.

SD-02 Shop Drawings

- Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.
- Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.
- Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

- Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials or equipment for some portion of the work.
- Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

- Physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.
- Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.
- Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies that are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

- Calculations, mix designs, analyses or other data pertaining to a part of work.
- Design submittals, design substantiation submittals and extensions of design submittals.

SD-06 Test Reports

- Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must

have been within three years of date of contract award for the project.)

- Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.
- Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.
- Investigation reports.
- Daily checklists.
- Final acceptance test and operational test procedure.

SD-07 Certificates

- Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.
- Document required of Contractor, or of a supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.
- Confined space entry permits.
- Text of posted operating instructions.

SD-08 Manufacturer's Instructions

- Preprinted material describing installation of a product, system or material, including special notices and Material Safety Data sheets concerning impedances, hazards and safety precautions.

SD-09 Manufacturer's Field Reports

- Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- Factory test reports.

SD-10 Operation and Maintenance Data

- Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

SD-11 Closeout Submittals

- Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

1.1.3. Approving Authority

Office authorized to approve submittal.

1.1.4. Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.2. NOT USED

1.3. SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.3.1. Designer of Record Approved (DA)

1.3.1.1. Designer of Record (DOR) approval is required for all extensions of design, critical materials, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings". Provide the Government the number of copies designated hereinafter of all DOR approved submittals, after the DOR has taken appropriate action. The DOR shall ensure that submittals conform to the Solicitation, the Accepted Proposal and the completed design, however see below for those submittals proposing a deviation to the contract or a substitution of a material, system, or piece of equipment that was identified by manufacturer, brand name or model description in the accepted contract proposal.

1.3.1.2. The DOR shall ensure that the submittals comply with all applicable Buy American Act and Trade Agreement Act clauses in the contract. The DOR may confer with the Contracting Officer's Representative for advice and interpretation of those clauses, as necessary.

1.3.1.3. The Government may, but is not required to, review any or all DOR approved submittals for conformance to the solicitation, accepted proposal and the completed design. Except for submittals designated as deviating from the Solicitation, the Accepted Proposal or completed design, the Contractor may proceed with acquisition and installation upon DOR approval. Government Approved (GA)

1.3.2. Government Approved (GA)

Government approval is required for any item specifically designated as requiring Government approval in the Solicitation, for internal and external color finish selections and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.3.3. Government Conformance Review of Design (CR)

The Government will review all intermediate and final design submittals for conformance with the technical requirements of the solicitation. Section 01 33 16 **DESIGN AFTER AWARD** covers the design submittal and review process in detail. Review will be only for conformance with the applicable codes, standards and contract requirements. Design data includes the design documents described in Section 01 33 16 **DESIGN AFTER AWARD**. Generally, design submittals should be identified as SD-05 Design Data submittals.

1.3.4. Designer of Record Approved/Government Conformance Review (DA/CR)

1.3.4.1. Deviations to the Accepted Design. Designer of Record approval and the Government's concurrence are required for any proposed deviation from the accepted design which still complies with the contract (the Solicitation and Accepted Proposal) before the Contractor is authorized to proceed with material acquisition or installation. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings." If necessary to facilitate the project schedule, the Contractor and the DOR may discuss a submittal proposing a deviation with the Contracting Officer's Representative prior to officially submitting it to the Government. However, the Government reserves the right to review the submittal before providing an opinion, if it deems it necessary. In any case, the Government will not formally agree to or provide a preliminary opinion on any deviation without the DOR's approval or recommended approval. The Government reserves the right to non-concur with any deviation from the design, which may impact furniture, furnishings, equipment selections or operations decisions that were made, based on the reviewed and concurred design.

1.3.4.2. Substitutions. Unless prohibited or provided for otherwise elsewhere in the Contract, where the accepted contract proposal named products, systems, materials or equipment by manufacturer, brand name and/or by model number or other specific identification, and the Contractor desires to substitute manufacturer or model after award, submit a requested substitution for Government concurrence. Include substantiation, identifying information and the DOR's approval, as meeting the contract requirements and that it is equal in function, performance, quality and salient features to that in the accepted contract proposal.

1.3.5. Designer of Record Approved/Government Approved (DA/GA)

Any proposed deviation to the solicitation and/or the accepted proposal constitutes a change to the contract. In addition to the above stated requirements for proposed deviations to the accepted design, both Designer of Record and Government Approval and, where applicable, a contract modification are required before the Contractor is

authorized to proceed with material acquisition or installation for any proposed deviation to the contract. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings". The Government reserves the right to accept or reject any such proposed deviation at its discretion.

1.3.6. Information Only

All submittals not requiring Designer of Record or Government approval will be for information only. Provide the Government "For Information Only" copies of all submittals not requiring Government approval or concurrence, after the Designer of Record has taken the appropriate action.

1.4. APPROVED OR CONCURRED WITH SUBMITTALS

Do not construe the Contracting Officer's approval of or concurrence with submittals as a complete check, but only that design, general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted Proposal. Approval or concurrence will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for design, dimensions, all design extensions, such as the design of adequate connections and details, etc., and the satisfactory construction of all work. The Government won't consider re-submittals for the purpose of substituting previously approved materials or equipment unless accompanied by an explanation of why a substitution is necessary.

1.5. DISAPPROVED SUBMITTALS

Make all corrections required by the Contracting Officer, obtain the Designer of Record's approval when applicable, and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. Resubmit any "information only" submittal found to contain errors or unapproved deviations from the Solicitation or Accepted Proposal as one requiring "approval" action, requiring both Designer of Record and Government approval. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, provide prompt notice in accordance with the Contract Clause "Changes" to the Contracting Officer.

1.6. WITHHOLDING OF PAYMENT

No payment for materials incorporated in the work will be made if all required Designer of Record or required Government approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.

1.7. GENERAL

Make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, the Contractor's Quality Control (CQC) System Manager and the Designer of Record, if applicable, shall check, approve, sign, and stamp all items, indicating action taken. Clearly identify proposed deviations from the contract requirements. Include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Schedule and make submittals requiring Government approval prior to the acquisition of the material or equipment covered thereby. Pick up and dispose of samples remaining upon completion of the work in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

1.8. SUBMITTAL REGISTER (GA)

Develop a complete list of submittals, including each separate design package submittal. Submit the initial submittal register within 15 days after Notice to Proceed, including, as a minimum, the design packages and other initial submittals required elsewhere in the contract. The Designer of Record shall identify required submittals in the

specifications, and use the list to prepare the Submittal Register, utilizing the government-provided software, QCS (see Section 01 45 01.10), to create the ENG Form 4288. Appendix R is a preliminary submittal register input form for use with the Quality Management System and the Resident Office Management System (QCS and RMS). The Government will provide the Contractor the actual Excel Spreadsheet version of this sample input form after award to modify and to use for input into QCS. The Excel Spreadsheet is not totally inputable into QCS, so additional keystroke input will be necessary. The sample input form is not all-inclusive. In addition, additional submittals may be required by other parts of the contract. After award, the parties will meet to discuss contract specific (or task order specific for a task order contract) distribution for the submittals all-inclusive and additional submittals may be required by other parts of the contract. Develop and complete the submittal register as the design is completed. Submit it to the Contracting Officer with the un-reviewed final design package submission or as soon as the design specifications are completed, if before the final design submission. When applicable, if the Contractor elects to fast track design and construction, using multiple design package submissions, update the submittal register to reflect the submittals associated with each design submission, clearly denoting all revisions to the previous submission. The submittal register serves as a scheduling document for submittals and for control of submittal actions throughout the contract period. Coordinate the submit dates and need dates used in the submittal register with dates in the Contractor prepared progress schedule. Submit monthly updates to the submittal register showing the Contractor action codes and actual dates with Government action codes and actual dates or until all submittals have been satisfactorily completed. Revise and submit the submittal register when revising the progress schedule.

1.9. SCHEDULING

Schedule submittals covering component items forming a system or items that are interrelated to be coordinated and submitted concurrently. Schedule certifications to be submitted with the pertinent drawings. Allow adequate time (a minimum of 15 calendar days exclusive of mailing time) and show on the register for those items requiring Government approval or concurrence. No delay damages or time extensions will be allowed for time lost in late submittals by the Contractor.

1.10. TRANSMITTAL FORM (ENG FORM 4025)

Use the transmittal form (ENG Form 4025) for submitting submittals in accordance with the instructions on the reverse side of the form. These forms will be furnished to the Contractor or are included in the QCS software if the Contractor is required to use QCS for this contract. Use a separate transmittal form for each specification section. Complete this form by filling out all the heading blank spaces and identify each item submitted. Exercise special care to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

1.11. SUBMITTAL PROCEDURES

Make submittals as follows:

1.11.1. Procedures

The Government will further discuss detailed submittal procedures with the Contractor at the Post-Award Conference.

1.11.2. Deviations

For submittals which include proposed deviations requested by the Contractor, check the column "variation" of ENG Form 4025. Set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

1.12. CONTROL OF SUBMITTALS

Carefully control his procurement operations to ensure that each individual submittal is made on or before the scheduled submittal date shown on the approved "Submittal Register."

1.13. GOVERNMENT APPROVED OR CONCURRED WITH SUBMITTALS

Upon completion of review of submittals requiring Government approval or concurrence, the Government will stamp and date the submittals as approved or concurred.. The Government will retain one (1) copies of the submittal and return zero(0) copy(ies) of the submittal.

1.14. INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe. The Government will retain zero(0) copies of information only submittals.

1.15. STAMPS

Use stamps similar to the following on the submittal data to certify that the submittal meets contract requirements:

CONTRACTOR

(FIRM NAME)

Approved

Approved with corrections as noted on submittal data and/or attached sheet(s)

Signature:

Title:

Date:

For design-build construction, both the Contractor Quality Control System Manager and the Designer of Record shall stamp and sign to certify that the submittal meets contract requirements.

SECTION 01 33 16 DESIGN AFTER AWARD

1.0 GENERAL INFORMATION

1.1. INTRODUCTION

1.2. DESIGNER OF RECORD

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. PRE-WORK ACTIVITIES & CONFERENCES

3.1.1. Design Quality Control Plan

3.1.2. Post Award Conference

3.1.3. Partnering & Project Progress Processes

3.1.4. Initial Design Conference

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3.2.2. Interim Design Submittals

3.2.3. Over-the-Shoulder Progress Reviews

3.2.4. Final Design Submissions

3.2.5. Design Complete Submittals

3.2.6. Holiday Periods for Government Review or Actions

3.2.7. Late Submittals and Reviews

3.3. DESIGN CONFIGURATION MANAGEMENT

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3.3.2. Tracking Design Review Comments

3.3.3. Design and Code Checklists

3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

3.4.1. General

3.4.2. Procedures

3.4.3. Conference Documentation

3.5. INTERIM DESIGN REQUIREMENTS

3.5.1. Drawings

3.5.2. Design Analyses

3.5.3. Geotechnical Investigations and Reports

3.5.4. LEED Documentation

3.5.5. Energy Conservation

3.5.6. Specifications

3.5.7. Building Rendering

3.5.8. Interim Building Design Contents

3.6. FINAL DESIGN REVIEWS AND CONFERENCES

3.7. FINAL DESIGN REQUIREMENTS

3.7.1. Drawings

3.7.2. Design Analysis

3.7.3. Specifications

3.7.4. Submittal Register

3.7.5. Preparation of DD Form 1354 (Transfer of Real Property)

3.7.6. Acceptance and Release for Construction

3.8. DESIGN COMPLETE CONSTRUCTION DOCUMENT REQUIREMENTS

3.9. SUBMITTAL DISTRIBUTION, MEDIA AND QUANTITIES

3.9.1. Submittal Distribution and Quantities

3.9.2. Web based Design Submittals

3.9.3. Mailing of Design Submittals

3.10. AS-BUILT DOCUMENTS

ATTACHMENT A STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS

ATTACHMENT B FURNITURE, FIXTURES AND EQUIPMENT REQUIREMENTS

ATTACHMENT C TRACKING COMMENTS IN DRCHECKS

ATTACHMENT D SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

ATTACHMENT E LEED SUBMITTALS

ATTACHMENT F BUILDING INFORMATION MODELING REQUIREMENTS

ATTACHMENT G DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT

1.0 GENERAL INFORMATION

1.1. INTRODUCTION

1.1.1. The information contained in this section applies to the design required after award. After award, the Contractor will develop the accepted proposal into the completed design, as described herein.

1.1.2. The Contractor may elect to fast track the design and construction that is, proceed with construction of parts of the sitework and facilities prior to completion of the overall design. To facilitate fast tracking, the Contractor may elect to divide the design into no more than six (6) design packages per major facility type and no more than three (3) design packages for site and associated work. Designate how it will package the design, consistent with its overall plan for permitting (where applicable) and construction of the project. See Sections 01 33 00 SUBMITTAL PROCEDURES and 01 32 01.00 10 PROJECT SCHEDULE for requirements for identifying and scheduling the design packaging plan in the submittal register and project schedule. See also Sections 01 10 00 STATEMENT OF WORK and 01 57 20.00 10 ENVIRONMENTAL PROTECTION for any specified permit requirements. If early procurement of long-lead item construction materials or installed equipment, prior to completion of the associated design package, is necessary to facilitate the project schedule, also identify those long-lead items and how it will assure design integrity of the associated design package to meet the contract requirements (The Contract consists of the Solicitation requirements and the accepted proposal). Once the Government is satisfied that the long-lead items meet the contract requirements, the Contracting Officer will allow the Contractor to procure the items at its own risk.

1.1.3. The Contractor may proceed with the construction work included in a separate design package after the Government has reviewed the final (100%) design submission for that package, review comments have been addressed and resolved to the Government's satisfaction and the Contracting Officer (or the Administrative Contracting Officer) has agreed that the design package may be released for construction.

1.1.4. **INTEGRATED DESIGN.** To the maximum extent permitted for this project, use a collaborative, integrated design process for all stages of project delivery with comprehensive performance goals for siting, energy, water, materials and indoor environmental quality and ensures incorporation of these goals. Consider all stages of the building lifecycle, including deconstruction.

1.2. DESIGNER OF RECORD

Identify, for approval, the Designer of Record ("DOR") that will be responsible for each area of design. One DOR may be responsible for more than one area. Listed, Professional Registered, DOR(s) shall account for all areas of design disciplines shall be accounted for by a listed. The DOR's shall stamp, sign, and date each design drawing and other design deliverables under their responsible discipline at each design submittal stage (see contract clause Registration of Designers). If the deliverables are not ready for release for construction, identify them as "preliminary" or "not for release for construction" or by using some other appropriate designation. The DOR(s) shall also be responsible for maintaining the integrity of the design and for compliance with the contract requirements through construction and documentation of the as-built condition by coordination, review and approval of extensions of design, material, equipment and other construction submittals, review and approval or disapproval of requested deviations to the accepted design or to the contract, coordination with the Government of the above activities, and by performing other typical professional designer responsibilities.

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. PRE-WORK ACTIVITIES & CONFERENCES

3.1.1. Design Quality Control Plan

Submit for Government acceptance, a Design Quality Control Plan in accordance with Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL before design may proceed.

3.1.2. Post Award Conference

3.1.2.1. The government will conduct a post award contract administration conference at the project site, as soon as possible after contract award. This will be coordinated with issuance of the contract notice to proceed (NTP). The Contractor and major sub-contractor representatives shall participate. All designers need not attend this first meeting. Government representatives will include COE project delivery team members, facility users, facility command representatives, and installation representatives. The Government will provide an agenda, meeting goals, meeting place, and meeting time to participants prior to the meeting.

3.1.2.2. The post award conference shall include determination and introduction of contact persons, their authorities, contract administration requirements, discussion of expected project progress processes, and coordination of subsequent meetings for quality control (see Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL), Partnering (see below and SCR: Partnering), and the initial design conference (see below).

3.1.2.3. The government will introduce COE project delivery team members, facility users, facility command representatives, and installation representatives. The DB Contractor shall introduce major subcontractors, and other needed staff. Expectations and duties of each person shall be defined for all participants. A meeting roster shall be developed and distributed by the government with complete contact information including name, office, project role, phone, mailing and physical address, and email address.

3.1.3. Partnering & Project Progress Processes

3.1.3.1. The initial Partnering conference may be scheduled and conducted at any time with or following the post award conference. The Government proposes to form a partnership with the DB Contractor to develop a cohesive building team. This partnership will involve the COE project delivery team members, facility users, facility command representatives, installation representatives, Designers of Record, major subcontractors, contractor quality control staff, and contractor construction management staff. This partnership will strive to develop a cooperative management team drawing on the strengths of each team member in an effort to achieve a quality project within budget and on schedule. This partnership will be bilateral in membership and participation will be totally voluntary. All costs, excluding labor and travel expenses, shall be shared equally between the Government and the Contractor. The Contractor and Government shall be responsible for their own labor and travel costs. Normally, partnering meetings will be held at or in the vicinity of the project installation.

3.1.3.2. As part of the partnering process, the Government and Contractor shall develop, establish, and agree to comprehensive design development processes including conduct of conferences, expectations of design development at conferences, fast-tracking, design acceptance, Structural Interior Design (SID)/ Furniture, Fixtures & Equipment (FF&E) design approval, project closeout, etc. The government will explain contract requirements and the DB Contractor shall review their proposed project schedule and suggest ways to streamline processes.

3.1.4. Initial Design Conference

The initial design conference may be scheduled and conducted at the project installation any time after the post award conference, although it is recommended that the partnering process be initiated with or before the initial design conference. Any design work conducted after award and prior to this conference should be limited to site and is discouraged for other items. All Designers of Record shall participate in the conference. The purpose of the meeting is to introduce everyone and to make sure any needs the contractor has are assigned and due dates established as well as who will get the information. See also Attachment F, BUILDING INFORMATION MODELING REQUIREMENTS for discussion concerning the BIM Implementation Plan demonstration at this meeting. The DB Contractor shall conduct the initial design conference.

3.1.5. Pre-Construction Conference

Before starting construction activities, the Contractor and Government will jointly conduct a pre-construction administrative conference to discuss any outstanding requirements and to review local installation requirements for start of construction. It is possible there will be multiple Pre-Construction Conferences based on the content of the design packages selected by the Contractor. The Government will provide minutes of this meeting to all participants.

3.2. STAGES OF DESIGN SUBMITTALS AND OVER THE SHOULDER PROGRESS REVIEWS

The stages of design submittals described below define Government expectations with respect to process and content. The Contractor shall determine how to best plan and execute the design and review process for this project, within the parameters listed below. As a minimum, the Government expects to see at least one interim design submittal, at least one final design submittal before construction of a design package may proceed and at least one Design Complete submittal that documents the accepted design. The Contractor may sub-divide the design into separate packages for each stage of design and may proceed with construction of a package after the Government accepts the final design for that package. See discussion on waivers to submission of one or more intermediate design packages where the parties partner during the design process. See also Attachment F, BUILDING INFORMATION MODELING REQUIREMENTS for discussion concerning BIM and the various stages of design submittals and over-the-shoulder progress reviews.

3.2.1. Site/Utilities

To facilitate fast-track design-construction activities the contractor may submit a final (100%) site and utility design as the first design submittal or it may elect to submit interim and final site and utility design submittals as explained below. Following review, resolution, and incorporation of all Government comments, and submittal of a satisfactory set of site/utility design documents, after completing all other pre-construction requirements in this contract and after the pre-construction meeting, the Government will allow the Contractor to proceed with site development activities, including demolition where applicable, within the parameters set forth in the accepted design submittal. For the first site and utility design submission, whether an interim or final, the submittal review, comment, and resolution times from this specification apply, except that the Contractor shall allow the Government a 14 calendar day review period, exclusive of mailing time. No on-site construction activities shall begin prior to written Government clearance to proceed.

3.2.2. Interim Design Submittals

The Contractor may submit either a single interim design for review, representing a complete package with all design disciplines, or split the interim design into smaller, individual design packages as it deems necessary for fast-track construction purposes. As required in Section 01 32 01.00 10 PROJECT SCHEDULE, the Contractor shall schedule its design and construction packaging plan to meet the contract completion period. This submission is the Government's primary opportunity to review the design for conformance to the solicitation and to the accepted contract proposal and to the Building Codes at a point where required revisions may be still made, while minimizing lost design effort to keep the design on track with the contract requirements. The requirements for the interim design review submittals and review conferences are described hereinafter. This is not necessarily a hold point for the design process; the Contractor may designate the interim design submittal(s) as a snapshot and proceed with design development at its own risk. See below for a waiver, where the parties establish an effective over-the-shoulder progress review procedure through the partnering process that would eliminate the need for or expedite a formal intermediate design review on one or more individual design packages.

3.2.3. Over-the-Shoulder Progress Reviews

To facilitate a streamlined design-build process, the Government and the Contractor may agree to one-on-one reviewer or small group reviews, electronically, on-line (if available within the Contractor's standard design practices) or at the Contractor's design offices or other agreed location, when practicable to the parties. The Government and Contractor will coordinate such reviews to minimize or eliminate disruptions to the design process. Any data required for these reviews shall normally be provided in electronic format, rather than in hard copy. If the Government and Contractor establish and implement an effective, mutually agreeable partnering procedure for regular (e.g., weekly) over-the-shoulder review procedures that allow the Government reviewers the opportunity to keep fully informed of the progress, contents, design intent, design documentation, etc. of the design package, the Government will agree to waive or to expedite the formal intermediate design review period for that package. The Contractor shall still be required to submit the required intermediate design documentation, however the parties may agree to how that material will be provided, in lieu of a formal consolidated submission of the package. It should be noted that Government funding is extremely limited for non-local travel by design reviewers, so the maximum use of virtual teaming methods must be used. Some possible examples include electronic file sharing, interactive software with on-line or telephonic conferencing, televideo conferencing, etc. The Government must still perform its Code and Contract conformance reviews, so the Contractor is encouraged to partner with the reviewers to find ways to facilitate this process and to facilitate meeting or bettering the design-build schedule. The Contractor shall maintain a fully functional configuration management system as described herein to track design revisions, regardless of whether or not there is a need for a formal intermediate design review. The formal intermediate

review procedures shall form the contractual basis for the official schedule, in the event that the partnering process determines that the formal intermediate review process to be best suited for efficient project execution. However, the Government pledges to support and promote the partnering process to work with the Contractor to find ways to better the design schedule.

3.2.4. Final Design Submissions

This submittal is required for each design package prior to Government acceptance of that design package for construction. The requirements for the final design submittal review conferences and the Government's acceptance for start of construction are described herein after.

3.2.5. Design Complete Submittals

After the final design submission and review conference for a design package, revise the design package to incorporate the comments generated and resolved in the final review conferences, perform and document a back-check review and submit the final, design complete documents, which shall represent released for construction documents. The requirements for the design complete submittals are described hereinafter.

3.2.6. Holiday Periods for Government Review or Actions

Do not schedule meetings, Government reviews or responses during the last two weeks of December or other designated Government Holidays (including Friday after Thanksgiving). Exclude such dates and periods from any durations specified herein for Government actions.

3.2.7. Late Submittals and Reviews

If the Contractor cannot meet its scheduled submittal date for a design package, it must revise the proposed submittal date and notify the government in writing, at least one (1) week prior to the submittal, in order to accommodate the Government reviewers' other scheduled activities. If a design submittal is over one (1) day late in accordance with the latest revised design schedule, or if notification of a proposed design schedule change is less than seven (7) days from the anticipated design submission receipt date, the Government review period may be extended up to seven (7) days due to reviewers' schedule conflicts. If the Government is late in meeting its review commitment and the delay increases the Contractor's cost or delays completion of the project, the Suspension of Work and Defaults clauses provide the respective remedy or relief for the delay.

3.3. DESIGN CONFIGURATION MANAGEMENT

3.3.1. Procedures

Develop and maintain effective, acceptable design configuration management (DCM) procedures to control and track all revisions to the design documents after the Interim Design Submission through submission of the As-Built documents. During the design process, this will facilitate and help streamline the design and review schedule. After the final design is accepted, this process provides control of and documents revisions to the accepted design (See Special Contract Requirement: Deviating From the Accepted Design). The system shall include appropriate authorities and concurrences to authorize revisions, including documentation as to why the revision must be made. The DCM data shall be available to the Government reviewers at all times. The Contractor may use its own internal system with interactive Government concurrences, where necessary or may use the Government's "DrChecks Design Review and Checking System" (see below and Attachment C).

3.3.2. Tracking Design Review Comments

Although the Contractor may use its own internal system for overall design configuration management, the Government and the Contractor shall use the DrChecks Design Review and Checking System to initiate, respond to, resolve and track Government design compliance review comments. This system may be useful for other data which needs to be interactive or otherwise available for shared use and retrieval. See Attachment C for details on how to establish an account and set-up the DrChecks system for use on the project.

3.3.3. Design and Code Checklists

Develop and complete various discipline-specific checklists to be used during the design and quality control of each submittal. Submit these completed checklists with each design submittal, as applicable, as part of the project documentation. See Section 01 45 04.00 10 Contractor Quality Control, Attachment D for a Sample Fire Protection and Life Safety Code review checklist and Attachment E for LEED SUBMITTALS.

3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

3.4.1. General

At least one interim design submittal, review and review conference is required for each design package (except that, per paragraph 3.2.1, the Contractor may skip the interim design submission and proceed directly to final design on the sitework and utilities package). The DB Contractor may include additional interim design conferences or over-the-shoulder reviews, as needed, to assure continued government concurrence with the design work. Include the interim submittal review periods and conferences in the project schedule and indicate what part of the design work is at what percentage of completion. The required interim design conferences shall be held when interim design requirements are reached as described below. See also Paragraph: **Over-the-Shoulder Progress Reviews** for a waiver to the formal interim design review.

3.4.2. Procedures

After receipt of an Interim Design submission, allow the Government fourteen (14) calendar days after receipt of the submission to review and comment on the interim design submittal. For smaller design packages, especially those that involve only one or a few separate design disciplines, the parties may agree on a shorter review period or alternative review methods (e.g., over-the-shoulder or electronic file sharing), through the partnering process. For each interim design review submittal, the COR will furnish, to the Contractor, a single consolidated, validated listing of all comments from the various design sections and from other concerned agencies involved in the review process using the DrChecks Design Review and Checking System. The review will be for conformance with the technical requirements of the solicitation and the Contractor's RFP proposal. If the Contractor disagrees technically with any comment or comments and does not intend to comply with the comment, he/she must clearly outline, with ample justification, the reasons for noncompliance within five (5) days after receipt of these comments in order that the comment can be resolved. Furnish disposition of all comments, in writing, through DrChecks. The Contractor is cautioned that if it believes the action required by any comment exceeds the requirements of this contract, that it should take no action and notify the COR in writing immediately. The Interim Review conference will be held for each design submittal at the installation. Bring the personnel that developed the design submittal to the review conference. The conference will take place the week after the receipt of the comments by the Contractor. For smaller fast-track packages that involve only a few reviewers, the parties may agree to alternative conferencing methods, such as teleconferencing, or televideo, where available, as determined through Partnering.

3.4.3. Conference Documentation

3.4.3.1. In order to facilitate and accelerate the Government code and contract conformance reviews, identify, track resolution of and maintain all comments and action items generated during the design process and make this available to the designers and reviewers prior to the Interim and subsequent design reviews.

3.4.3.2. The DB Contractor shall prepare meeting minutes and enter final resolution of all comments into DrChecks. Copies of comments, annotated with comment action agreed on, will be made available to all parties before the conference adjourns. Unresolved problems will be resolved by immediate follow-on action at the end of conferences. Incorporate valid comments. The Government reserves the right to reject design document submittals if comments are significant. Participants shall determine if any comments are critical enough to require further design development prior to government concurrence. Participants shall also determine how to proceed in order to obtain government concurrence with the design work presented.

3.5. INTERIM DESIGN REQUIREMENTS

Interim design deliverables shall include drawings, specifications, and design analysis for the part of design that the Contractor considers ready for review.

3.5.1. Drawings

Include comments from any previous design conferences incorporated into the documents to provide an interim design for the "part" submitted.

3.5.2. Design Analyses

3.5.2.1. The designers of record shall prepare and present design analyses with calculations necessary to substantiate and support all design documents submitted. Address design substantiation required by the applicable codes and references and pay particular attention to the following listed items:

3.5.2.2. For parts including sitework, include site specific civil calculations.

3.5.2.3. For parts including structural work, include structural calculations.

- (a) Identify all loads to be used for design.
- (b) Describe the method of providing lateral stability for the structural system to meet seismic and wind load requirements. Include sufficient calculations to verify the adequacy of the method.
- (c) Provide calculations for all principal roof, floor, and foundation members and bracing and secondary members.
- (d) Provide complete seismic analyses for all building structural, mechanical, electrical, architectural, and building features as dictated by the seismic zone for which the facility is being constructed.
- (e) Computer generated calculations must identify the program name, source, and version. Provide input data, including loads, loading diagrams, node diagrams, and adequate documentation to illustrate the design. The schematic models used for input must show, as a minimum, nodes/joints, element/members, materials/properties, and all loadings, induced settlements/deflections, etc., and a list of load combinations. Include an output listing for maximum/minimum stresses/forces and deflections for each element and the reactions for each loading case and combination.
- (f) See also the Security (Anti-Terrorism) requirements below for members subject to Anti-Terrorist Force Protection (ATFP) and Progressive Collapse requirements.
- (g) Fully coordinate and integrate the overall structural design between two different or interfacing construction types, such as modular and stick-built or multistory, stacked modular construction. Provide substantiation of structural, consolidation/settlement analysis, etc., as applicable, through the interfaces.

3.5.2.4. For Security (Anti-Terrorism): Provide a design narrative and calculations where applicable, demonstrating compliance with each of the 22 standards in UFC 4-010-01, which includes Design of Buildings to Resist Progressive Collapse (use the most recent version of UFC 4-023-03, regardless of references to any specific version in UFC 4-010-01). Where sufficient standoff distance is not being provided, show calculations for blast resistance of the structural system and building envelope. Show complete calculations for members subjected to ATFP loads, e.g., support members of glazed items (jambes, headers, sills) connections of windows to support members and connections of support members to the rest of the structure. For 3 story and higher buildings, provide calculations to demonstrate compliance with progressive collapse requirements.

3.5.2.5. For parts including architectural work, include building floor area analysis.

3.5.2.6. For parts including mechanical work, include HVAC analysis and calculations. Include complete design calculations for mechanical systems. Include computations for sizing equipment, compressed air systems, air duct design, and U-factors for ceilings, roofs and exterior walls and floors. Contractor shall employ commercially available energy analysis techniques to determine the energy performance of all passive systems and features. Use of hourly energy load computer simulation is required (see paragraph 3.5.5.2 for list of acceptable software). Based on the results of calculations, provide a complete list of the materials and equipment proposed with the manufacturer's published cataloged product installation specifications and roughing-in data.

3.5.2.7. For parts including life safety, include building code analysis and sprinkler and other suppression systems. Notwithstanding the requirements of the Codes, address the following:

- (a) A registered fire protection engineer (FPE) must perform all fire protection analyses. Provide the fire protection engineer's qualifications. See Section 01 10 00, paragraph 5 for qualifications.

- (b) Provide all references used in the design including Government design documents and industry standards used to generate the fire protection analysis.
- (c) Provide classification of each building in accordance with fire zone, building floor areas and height and number of stories.
- (d) Provide discussion and description of required fire protection requirements including extinguishing equipment, detection equipment, alarm equipment and water supply. Alarm and detection equipment shall interface to requirements of Electronic Systems.
- (e) Provide hydraulic calculations based on water flow test for each sprinkler system to insure that flow and pressure requirements can be met with current water supply. Include copies of Contractor's water flow testing done to certify the available water source.

3.5.2.8. For parts including plumbing systems:

- (a) List all references used in the design.
- (b) Provide justification and brief description of the types of plumbing fixtures, piping materials and equipment proposed for use.
- (c) Detail calculations for systems such as sizing of domestic hot water heater and piping; natural gas piping; LP gas piping and tanks, fuel oil piping and tanks, etc., as applicable.
- (d) When the geotechnical report indicates expansive soils are present, indicate in the first piping design submittal how piping systems will be protected against damage or backfall/backflow due to soil heave (from penetration of slab to the 5 foot building line).

3.5.2.9. For elevator systems:

- (a) List all criteria codes, documents and design conditions used.
- (b) List any required permits and registrations for construction of items of special mechanical systems and equipment.

3.5.2.10. For parts including electrical work, include lighting calculations to determine maintained foot-candle levels, electrical load analysis and calculations, electrical short circuit and protective device coordination analysis and calculations and arc fault calculations.

3.5.2.11. For parts including telecommunications voice/data (including SIPRNET, where applicable), include analysis for determining the number and placement of outlets

3.5.2.12. For Cathodic Protection Systems, provide the following stamped report by the licensed corrosion engineer or NACE specialist with the first design submission. The designer must be qualified to engage in the practice of corrosion control of buried or submerged metallic surfaces. He/she must be accredited or certified by the National Association of Corrosion Engineers (NACE) as a NACE Accredited Corrosion Specialist or a NACE certified Cathodic Protection Specialist, or must be a registered professional engineer with a minimum of five years experience in corrosion control and cathodic protection. Clearly describe structures, systems or components in soil or water to be protected. Describe methods proposed for protection of each.

3.5.3. Geotechnical Investigations and Reports:

3.5.3.1. The contractor's licensed geotechnical engineer shall prepare a final geotechnical evaluation report, to be submitted along with the first foundation design submittal. Make this information available as early as possible during the over-the-shoulder progress review process. Summarize the subsurface conditions and provide recommendations for the design of appropriate utilities, foundations, floor slabs, retaining walls, embankments, and pavements. Include compaction requirements for fill and backfill under buildings, sidewalks, other structures and open areas. Recommend foundation systems to be used, allowable bearing pressures for footings, lateral load resistance capacities for foundation systems, elevations for footings, grade beams, slabs, etc. Provide an assessment of post-construction settlement potential including total and differential. Provide recommendations regarding lateral earth pressures (active, at-rest, passive) to be used in the design of retaining walls. Include the recommended spectral accelerations and Site Class for seismic design along with an evaluation of any seismic hazards and recommendations for mitigation, if required. Include calculations to support the recommendations for bearing capacity, settlement, and pavement sections. Include supporting documentation for all recommended

design parameters such as Site Class, shear strength, earth pressure coefficients, friction factors, subgrade modulus, California Bearing Ratio (CBR), etc. Provide earthwork recommendations, expected frost penetration, expected groundwater levels, recommendations for dewatering and groundwater control and the possible presence of any surface or subsurface features that may affect the construction of the project such as sinkholes, boulders, shallow rock, old fill, old structures, soft areas, or unusual soil conditions. Include pH tests, salinity tests, resistivity measurements, etc., required to design corrosion control and grounding systems. Include the raw field data. Arrange a meeting with the Government subsequent to completion and evaluation of the site specific geotechnical exploration to outline any differences encountered that are inconsistent with the Government provided preliminary soils information. Clearly outline differences which require changes in the foundation type, or pavement and earthwork requirements from that possible and contemplated using the Government furnished preliminary soils investigation, which result in a change to the design or construction. Any equitable adjustment is subject to the provisions of the contract's Differing Site Conditions Clause.

3.5.3.2. Vehicle Pavements: The Contractor's geotechnical report shall contain flexible and rigid pavement designs, as applicable for the project, including design CBR and modulus of subgrade reaction and the required compaction effort for subgrades and pavement layers. Provide Information on the types of base course materials available in the area and design strengths.

3.5.3.3. The Contractor and the professional geotechnical engineer consultant shall certify in writing that the design of the project has been developed consistent with the Contractor's final geotechnical report. The certification shall be stamped by the consulting professional geotechnical engineer and shall be submitted with the first design submission. If revisions are made to the initial design submission, a new certification shall be provided with the final design submission.

3.5.4. LEED Documentation:

Assign a LEED Accredited Professional, responsible to track LEED planning, performance and documentation for each LEED credit through construction closeout. Incorporate LEED credits in the plans, specifications and design analyses. Develop LEED supporting documentation as a separable portion of the Design Analysis and provide with each required design submittal. Include the LEED Project checklist for each non-exempt facility (one checklist may be provided for multiple facilities in accordance with the LEED-NC Application Guide for Multiple Buildings and On-Campus Building Projects and the LEED SUBMITTALS (Attachment E, herein) with each submittal. Final design submittal for each portion of the work must include all required design documentation relating to that portion of work (example - all site credit design documents with final site design). Submittal requirements are as indicated in Attachment E, LEED SUBMITTALS. Submit all documentation indicated on Attachment E as due at final design at final design submittal (for fast-track projects with multiple final design submittals, this shall be at the last scheduled final design submittal). All project documentation related to LEED shall conform to USGBC requirements for both content and format, including audit requirements and be separate from other design analyses. Maintain and update the LEED documentation throughout project progress to construction closeout and shall compile product data, receipts, calculations and other data necessary to substantiate and support all credits claimed. The Government may audit any or all individual credits. Audit documentation is not required to be submitted unless requested. These requirements apply to all projects. If the project requires the Contractor to obtain USGBC certification, the Contractor shall also be responsible for obtaining USGBC certification and shall provide written evidence of certification with the construction closeout LEED documentation submittal. Install the USGBC building plaque at the location indicated by the Government upon receipt. If Contractor obtains USGBC interim design review, submit the USGBC review to the Government within 30 days of receipt for information only.

3.5.4.1. LEED Documentation for Technology Solution Set. If the Solicitation provides a Prescriptive Technology Solution Set, use of the Technology Solution set has no effect on LEED documentation requirements. Provide all required LEED documentation, including energy analysis, in accordance with LEED requirements when using the Technology Solution Set.

3.5.5. Energy Conservation:

3.5.5.1. Refer to Section 01 10 00, Paragraph 5. Interim and Final Design submittals shall demonstrate that each building including the building envelope, HVAC systems, service water heating, power, and lighting systems meet the Mandatory Provisions and the Prescriptive Path requirements of ASHRAE 90.1. Use Compliance Documentation forms available from ASHRAE and included in the ASHRAE 90.1 User's Manual for this purpose. The Architectural Section of the Design Analysis shall include completed forms titled "Building Envelope

Compliance Documentation Parts I and II". The Heating Ventilating and Air Conditioning (HVAC) Section of the Design Analysis shall include a completed form titled "HVAC Simplified Approach Option - Part I" if this approach is allowed by the Standard. Otherwise, the HVAC Section of the Design Analysis shall include completed forms titled "HVAC Mandatory Provisions - Part II" and "HVAC Prescriptive Requirements - Part III". The Plumbing Section of the Design Analysis shall include a completed form titled "Service Water Heating Compliance Documentation". The Electrical Section of the Design Analysis shall include an explanatory statement on how the requirements of ASHRAE 90.1-2004 Chapter 8 Power were met. The Electrical Section of the Design Analysis shall also include a completed form titled "Lighting Compliance Documentation".

3.5.5.2. Interim and Final Design submittals which address energy consuming systems, (heating, cooling, service hot water, lighting, power, etc.) must also include calculations in a separate Energy Conservation Section of the Design Analysis which demonstrate and document (a) the baseline energy consumption for the facility or facilities under contract, that would meet the requirements of ANSI/ASHRAE/IESNA Standard 90.1 and (b) the energy consumption of the facility or facilities under contract utilizing the materials and methods required by this construction contract. Use the USGBC Energy and Atmosphere (EA) Credit 1 compliance template / form or an equivalently detailed form for documenting compliance with the energy reduction requirements. This template / form is titled PERFORMANCE RATING METHOD and is available when the project is registered for LEED. The calculation methodology used for this documentation and analysis shall follow the guidelines set forth in Appendix G of ASHRAE 90.1, with two exceptions: a) receptacle and process loads may be omitted from the calculation; and b) the definition of the terms in the formula for Percentage Improvement found in paragraph G1.2 are modified as follows: Baseline Building Performance shall mean the annual energy consumption calculated for a building design intended for use as a baseline for rating above standard design meeting the minimum requirements of the energy standard, and Proposed Building Performance shall mean annual energy consumption calculated for the proposed building design intended for construction. This calculation shall address all energy consuming systems in a single integrated methodology. Include laboratory fume hoods and kitchen ventilation loads in the energy calculation. They are not considered process loads. Individual calculations for heating, cooling, power, lighting, power, etc. systems will not be acceptable. The following building simulation software is acceptable for use in calculating building energy consumption: Hourly Analysis Program (HAP) by Carrier Corp., TRACE 700 by Trane Corp., DOE-2 by US Department of Energy, EnergyPlus by DOD/DOE.

3.5.6. Specifications

Specifications may be any one of the major, well known master guide specification sources (use only one source) such as MASTERSPEC from the American Institute of Architects, SPECTEXT from Construction Specification Institute or Unified Facility Guide Specifications (UFGS using MASTERFORMAT 2004 numbering system), etc. (including specifications from these sources). Manufacturers' product specifications, utilizing CSI's Manu-Spec, three part format may be used in conjunction with the selected specifications. The designers of record shall edit and expand the appropriate Specifications to insure that all project design requirements, current code requirements, and regulatory requirements are met. Specifications shall clearly identify, where appropriate, specific products chosen to meet the contract requirements (i.e., manufacturers' brand names and model numbers or similar product information).

3.5.7. Building Rendering

Present and provide a draft color computer, artist, or hand drawn rendering with the conceptual design submittal of the building exterior. Perspective renderings shall include a slightly overhead view of the entire building to encompass elevations and the roof configuration of the building. After Government review and acceptance, provide a final rendering, including the following:

Three (3) 18" x 24" color prints, framed and matted behind glass with project title underneath the print.

One (1) Image file (high resolution) in JPG format on CD for those in the submittal distribution list.

3.5.8. Interim Building Design Contents

The following list represents what the Government considers should be included in the overall completed design for a facility or project. It is not intended to limit the contractor from providing different or additional information as needed to support the design presented, including the require design analyses discussed above. As the Contractor develops individual design packages and submits them for Interim review, include as much of the applicable

information for an individual design package as is developed at the Interim design level for review purposes. These pieces shall be developed as the design progresses toward the design complete stage.

3.5.8.1. Lawn and Landscaping Irrigation System

3.5.8.2. Landscape, Planting and Turfing

3.5.8.3. Architectural

- (a) Design Narrative
- (b) Architectural Floor Plans, Typical Wall and Roof Sections, Elevations
- (c) Finish schedule
- (d) All required equipment
- (e) Special graphics requirements
- (f) Door and Window Schedules
- (g) Hardware sets using BHMA designations
- (h) Composite floor plan showing all pre-wired workstations
- (i) Structural Interior Design (SID) package: See ATTACHMENT A for specific requirements
- (j) Furniture, Fixtures & Equipment (FF&E) design package: See ATTACHMENT B for specific requirements

3.5.8.4. Structural Systems. Include:

- (a) Drawings showing principal members for roof and floor framing plans as applicable
- (b) Foundation plan showing main foundation elements where applicable
- (c) Typical sections for roof, floor, and foundation conditions

3.5.8.5. Plumbing Systems

- (a) Show locations and general arrangement of plumbing fixtures and major equipment
- (b) Plan and isometric riser diagrams of all areas including hot water, cold water, waste and vent piping. Include natural gas (and meter as required), (natural gas and meter as required), (LP gas), (fuel oil) and other specialty systems as applicable.
- (c) Include equipment and fixture connection schedules with descriptions, capacities, locations, connection sizes and other information as required

3.5.8.6. HVAC Systems

- (a) Mechanical Floor Plans: The floor plans shall show all principle architectural features of the building which will affect the mechanical design. The floor plans shall also show the following:
 - (1) Room designations.
 - (2) Mechanical legend and applicable notes.
 - (3) Location and size of all ductwork and piping.
 - (4) Location and capacity of all terminal units (i.e., registers, diffusers, grilles, hydronic baseboards).
 - (5) Pre-Fabricated Paint Spray Booth (where applicable to project scope)
 - (6) Paint Preparation Area (where applicable to project scope)
 - (7) Exhaust fans and specialized exhaust systems.
 - (8) Thermostat location.
 - (9) Location of heating/cooling plant (i.e., boiler, chiller, cooling tower, etc).
 - (10) Location of all air handling equipment.

- (11) Air balancing information.
- (12) Flue size and location.
- (13) Piping diagram for forced hot water system (if used).
- (b) Equipment Schedule: Provide complete equipment schedules. Include:
 - (1) Capacity
 - (2) Electrical characteristics
 - (3) Efficiency (if applicable)
 - (4) Manufacturer's name
 - (5) Optional features to be provided
 - (6) Physical size
 - (7) Minimum maintenance clearances
- (a) Details: Provide construction details, sections, elevations, etc., only where required for clarification of methods and materials of design.
- (b) HVAC Controls: Submit complete HVAC controls equipment schedules, sequences of operation, wiring and logic diagrams, Input/Output Tables, equipment schedules, and all associated information. See the Statement of Work for additional specific requirements.

3.5.8.7. Fire Protection and Life Safety.

- (a) Provide plan for each floor of each building that presents a compendium of the total fire protection features being incorporated into the design. Include the following types of information:
 - (1) The location and rating of any fire-resistive construction such as occupancy separations, area separations, exterior walls, shaft enclosures, corridors, stair enclosures, exit passageways, etc.
 - (2) The location and coverage of any fire detection systems
 - (3) The location and coverage of any fire suppression systems (sprinkler risers, standpipes, etc.)
 - (4) The location of any other major fire protection equipment
 - (5) Indicate any hazardous areas and their classification
 - (6) Schedule describing the internal systems with the following information: fire hazard and occupancy classifications, building construction type, GPM/square foot sprinkler density, area of operation and other as required
- (b) Working plans and all other materials submitted shall meet NFPA 13 requirements, with respect to required minimum level of detail.

3.5.8.8. Elevators. Provide:

- (a) Description of the proposed control system
- (b) Description, approximate capacity and location of any special mechanical equipment for elevators.

3.5.8.9. Electrical Systems.

- (a) Electrical Floor Plan(s): Show all principle architectural features of the building which will affect the electrical design. Show the following:
 - (1) Room designations.
 - (2) Electrical legend and applicable notes.
 - (3) Lighting fixtures, properly identified.
 - (4) Switches for control of lighting.
 - (5) Receptacles.

- (6) Location and designation of panelboards. Clearly indicate type of mounting required (flush or surface) and reflect accordingly in specifications.
- (7) Service entrance (conduit and main disconnect).
- (8) Location, designation and rating of motors and/or equipment which requires electrical service. Show method of termination and/or connection to motors and/or equipment. Show necessary junction boxes, disconnects, controllers (approximate only), conduit stubs, and receptacles required to serve the motor and/or equipment.
- (b) Building Riser Diagram(s) (from pad-mounted transformer to unit load center panelboard): Indicate the types and sizes of electrical equipment and wiring. Include grounding and metering requirements.
- (c) Load Center Panelboard Schedule(s): Indicate the following information:
 - (1) Panelboard Characteristics (Panel Designation, Voltage, Phase, Wires, Main Breaker Rating and Mounting.
 - (2) Branch Circuit Designations.
 - (3) Load Designations.
 - (4) Circuit Breaker Characteristics. (Number of Poles, Trip Rating, AIC Rating)
 - (5) Branch Circuit Connected Loads (AMPS).
 - (6) Special Features
- (d) Lighting Fixture Schedule(s): Indicate the following information:
 - (1) Fixture Designation.
 - (2) General Fixture Description.
 - (3) Number and Type of Lamp(s).
 - (4) Type of Mounting.
 - (5) Special Features.
- (e) Details: Provide construction details, sections, elevations, etc. only where required for clarification of methods and materials of design.

3.5.8.10. Electronic Systems including the following responsibilities:

- (a) Fire Detection and Alarm System. Design shall include layout drawings for all devices and a riser diagram showing the control panel, annunciator panel, all zones, radio transmitter and interfaces to other systems (HVAC, sprinkler, etc.)
- (b) Fire Suppression System Control. Specify all components of the Fire Suppression (FS) System in the FS section of the specifications. Clearly describe how the system will operate and interact with other systems such as the fire alarm system. Include a riser diagram on the drawings showing principal components and interconnections with other systems. Include FS system components on drawing legend. Designate all components shown on floor plans "FS system components" (as opposed to "Fire Alarm components"). Show location of FS control panels, HVAC control devices, sensors, and 120V power panel connections on floor plans. Indicate zoning of areas by numbers (1, 2, 3) and detectors sub-zoned for cross zoning by letter designations (A and B). Differentiate between ceiling mounted and under floor detectors with distinct symbols and indicate sub-zone of each.
- (c) Public Address System
- (d) Special Grounding Systems. Completely reflect all design requirements in the specifications and drawings. Specifications shall require field tests (in the construction phase), witnessed by the Government, to determine the effectiveness of the grounding system. Include drawings showing existing construction, if any.
- (e) Cathodic Protection.
- (f) Intrusion Detection, Card Access System
- (g) Central Control and Monitoring System
- (h) Mass Notification System
- (i) Electrical Power Distribution Systems

3.5.8.11. Separate detailed Telecommunications drawings for Information Systems including the following responsibilities:

(a) Telecommunications Cabling

(b) Supporting Infrastructure

(a) Outside Plant (OSP) Cabling - Campus or Site Plans - Exterior Pathways and Inter-Building Backbones

(a) Include a layout of the voice/data outlets (including voice only wall & pay phones) on telecommunication floor plan drawing, location of SIPRNET data outlets (where applicable), and a legend and symbol definition to indicate height above finished floor. Show size of conduit and cable type and size on Riser Diagram. Do not show conduit runs between backboard and outlets on the floor plans. Show underground distribution conduit and cable with sizing from point of presence to entrance facility of building.

(b) Layout of complete building per floor - Serving Zone Boundaries, Backbone Systems, and Horizontal Pathways including Serving Zones Drawings - Drop Locations and Cable ID's

(c) Communication Equipment Rooms - Plan Views - Tech and AMEP/Elevations - Racks and Walls. Elevations with a detailed look at all telecom rooms. Indicate technology layout (racks, ladder-racks, etc.), mechanical/electrical layout, rack elevation and backboard elevation. They may also be an enlargement of a congested area of T1 or T2 series drawing.

3.6. FINAL DESIGN REVIEWS AND CONFERENCES

A final design review and review conference will be held upon completion of final design at the project installation, or – where equipment is available - by video teleconference or a combination thereof, for any design package to receive Government acceptance to allow release of the design package for construction. For smaller separate design packages, the parties may agree on alternative reviews and conferences (e.g., conference calls and electronic file sharing, etc.) through the Partnering process. Include the final design conference in the project schedule and shall indicate what part of the design work is at 100% completion. The final design conference will be held after the Government has had seven (7) calendar days after receipt of the submission to review the final design package and supporting data. For smaller packages, especially those involving only one or a few design disciplines the parties may agree on a shorter period.

3.7. FINAL DESIGN REQUIREMENTS

Final design deliverables for a design package shall consist of 100% complete drawings, specifications, submittal register and design analyses for Government review and acceptance. The 100% design submission shall consist of drawings, specifications, updated design analyses and any permits required by the contract for each package submitted. In order to expedite the final design review, prior to the conference, ensure that the design configuration management data and all review comment resolutions are up-to-date. Include the 100% SID and 100% FF&E binders for government approval. The Contractor shall have performed independent technical reviews (ITR's) and back-checks of previous comment resolutions, as required by Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL, including providing documentation thereof. Use DrChecks or other acceptable comment tracking system during the ITR and submit the results with each final design package

3.7.1. Drawings

3.7.1.1. Submit drawings complete with all contract requirements incorporated into the documents to provide a 100% design for each package submitted.

3.7.1.2. Prepare all drawings with the Computer-Aided Design and Drafting (CADD)/Computer-Aided Design (CAD) system, organized and easily referenced electronically, presenting complete construction information.

3.7.1.3. Drawings shall be complete. The Contractor is encouraged to utilize graphics, views, notes, and details which make the drawings easier to review or to construct but is also encouraged to keep such materials to those that are necessary.

3.7.1.4. Provide detail drawings that illustrate conformance with the contract. Include room finish schedules, corresponding color/finish/special items schedules, and exterior finish schedules that agree with the submitted SID binders.

3.7.1.5. The design documents shall be in compliance with the latest version of the A/E/C CAD Standard, available at <https://cadbim.usace.army.mil/CAD>. Use the approved vertical Corps of Engineers title blocks and borders on all drawings with the appropriate firm name included within the title block area.

3.7.1.6. CAD System and Building Information Modeling (BIM) (NOTE: If this is a Single Award or Multiple Award, Indefinite Delivery/Indefinite Quantity Contract, this information will be provided for each task order.)

All CAD files shall be fully compatible with AutoCAD 2000 or higher. Save all design CAD files as AutoCAD 2000 or higher files. All submitted BIM Models and associated Facility Data shall be fully compatible with Bentley BIM file format and the USACE Bentley BIM v8 Workspace.

(a) CAD Data Final File Format: During the design development capture geo-referenced coordinates of all changes made to the existing site (facility footprint, utility line installations and alterations, roads, parking areas, etc) as a result of this contract. There is no mandatory methodology for how the geo-referenced coordinates will be captured, however, Engineering and Construction Bulletin No. 2006-15, Subject: Standardizing Computer Aided Design (CAD) and Geographic Information Systems (GIS) Deliverables for all Military Design and Construction Projects identifies the format for final as-built drawings and data sets to be delivered to the government. Close-out requirements at the as-built stage; require final geo-referenced GIS Database of the new facility along with all exterior modifications. The Government will incorporate this data set into the Installation's GIS Masterplan or Enterprise GIS System. See also, Section 01 78 02.00 10 Closeout Submittals.

(b) Electronic Drawing Files: In addition to the native CAD design files, provide separate electronic drawing files (in editable CAD format and Adobe Acrobat PDF version 7.0 or higher) for each project drawing.

(c) Each file (both CAD and PDF) shall represent one complete drawing from the drawing set, including the date, submittal phase, and border. Each drawing file shall be completely independent of any data in any other file, including fonts and shapes not included with the basic CAD software program utilized. Fonts that are not included as part of the default CAD software package installation or recognized as an allowable font by the A/E/C CAD Standard are not acceptable in delivered CAD files. All displayed graphic elements on all levels of the drawing files shall be part of the project drawing image. The drawing files shall not contain any graphic element that is not part of the drawing image.

(d) Deliver BIM Model and associated Facility Data files in their native format. At a minimum, BIM files shall address major architecture design elements, major structural components, mechanical systems and electrical/communication distribution and elements as defined in Attachment F. See Attachment F for additional BIM requirements.

(e) Drawing Index: Provide an index of drawings sheet in CAD as part of the drawing set, and an electronic list in Microsoft Excel of all drawings on the CD. Include the electronic file name, the sheet reference number, the sheet number, and the sheet title, containing the data for each drawing.

(f) Hard Copies: Plot submitted hard copy drawings directly from the "electronic drawing files" and copy for quantities and sizes indicated in the distribution list at the end of this specification section. The Designers of Record shall stamp, sign and date original hard copy sheets as Released For Construction, and provide copies for distribution from this set.

3.7.2. Design Analyses

3.7.2.1. The designers of record shall update, finalize and present design analyses with calculations necessary to substantiate and support all design documents submitted.

3.7.2.2. The responsible DOR shall stamp, sign and date the design analysis. Identify the software used where, applicable (name, version, vendor). Generally, provide design analyses, individually, in an original (file copy) and one copy for the assigned government reviewer.

3.7.2.3. All disciplines review the LEED design analysis in conjunction with their discipline-specific design analysis; include a copy of the separable LEED design analysis in all design analysis submittals.

3.7.2.4. Do not combine multi-disciplined volumes of design-analysis, unless multiple copies are provided to facilitate multiple reviewers (one copy per each separate design analysis included in a volume).

3.7.3. Specifications

Specifications shall be 100% complete and in final form.

3.7.4. Submittal Register

Prepare and update the Submittal Register and submit it with the 100% design specifications (see Specification Section 01 33 00, SUBMITTAL PROCEDURES) with each design package. Include the required submittals for each specification section in a design package in the submittal register.

3.7.5. Preparation of DD Form 1354 (Transfer of Real Property)

This form itemizes the types, quantities and costs of various equipment and systems that comprise the project, for the purpose of transferring the new construction project from the Corps Construction Division to the Installation's inventory of real property. The Government will furnish the DB Contractor's design manager a DD Form 1354 checklist to use to produce a draft Form 1354. Submit the completed checklist and prepared draft Form DD 1354 with the 100% design in the Design Analysis. The Corps will use these documents to complete the final DD 1354 upon completion of construction.

3.7.6. Acceptance and Release for Construction

3.7.6.1. At the conclusion of the Final Design Review (after resolutions to the comments have been agreed upon between DOR and Government reviewers), the Contracting Officer or the ACO will accept the Final Design Submission for the design package in writing and allow construction to start for that design package. The Government may withhold acceptance until all major corrections have been made or if the final design submission requires so many corrections, even though minor, that it isn't considered acceptably complete.

3.7.6.2. Government review and acceptance of design submittals is for contract conformance only and shall not relieve the Contractor from responsibility to fully adhere to the requirements of the contract, including the Contractor's accepted contract proposal, or limit the Contractor's responsibility of design as prescribed under Special Contract Requirement: "Responsibility of the Contractor for Design" or limit the Government's rights under the terms of the contract. The Government reserves the right to rescind inadvertent acceptance of design submittals containing contract deviations not separately and expressly identified in the submittal for Government consideration and approval.

3.8. DESIGN COMPLETE CONSTRUCTION DOCUMENT REQUIREMENTS

After the Final Design Submission and Review Conference and after Government acceptance of the Final Design submission, revise the design documents for the design package to incorporate the comments generated and resolved in the final review conference, perform and document a back-check review and submit the final, design complete documents. Label the final design complete documents "FOR CONSTRUCTION" or use similar language. In addition to the final drawings and specifications, the following deliverables are required for distribution and field use. The deliverable includes all documentation and supporting design analysis in final form, as well as the final review comments, disposition and the back-check. As part of the quality assurance process, the Government may perform a back-check of the released for construction documentation. Promptly correct any errors or omissions found during the Government back-check. The Government may withhold retainage from progress payments for work or materials associated with a final design package until this submittal has been received and the Government determines that it is complete.

3.9. SUBMITTAL DISTRIBUTION, MEDIA AND QUANTITIES

3.9.1. Submittal Distribution and Quantities

General: The documents which the Contractor shall submit to the Government for each submittal are listed and generally described in preceding paragraphs in this Section. Provide copies of each design submittal and design substantiation as follows (NOTE: If this is a Single Award or Multiple Award, Indefinite Delivery/Indefinite Quantity Contract, this information will be provided for each task order):

Activity and Address	Drawing Size (Full Size) Full-Size Full Sets/ *Partial Sets	Design Analyses & Specs Full Sets/ *Partial Sets	Drawing Size (Half Size) Half-Size Full Sets/ *Partial Sets	Non-BIM Data CD-ROM or DVD as Necessary (PDF& .dwg)	Furniture Submittal (Per Attachment B)	Structural Interior Design Submittal	BIM Data DVD (Per Attach F)
Commander, U.S.Army Engineer District Fort Worth	0/0	3/0	3/0	4	1	1	0
Commander, U.S.Army Engineer District, Center of Standardization Huntsville Center	0/0	1/0	1/0	1	N/A	1	0
Installation	1/0	8/0	11/0	19	2	4	0
U.S.Army Corps of Engineers Construction Area Office	4/0	4/0	4/0	4	1	4	0
Information Systems Engineering Command (ISEC)	0/0	0/1	0/0	1	N/A	N/A	1
Other Offices	0/0	5/0	5/0	7	N/A	5	2

***NOTE: For partial sets of drawings, specifications and design analyses, see paragraph 3.9.3.3, below.**

****NOTE: When specified below in 3.9.2, furnish Installation copies of Drawings as paper copies, in lieu of the option to provide secure web-based submittals.**

3.9.2. Web based Design Submittals

Except for full or half-sized drawings for Installation personnel, as designated in the Table above, Web based design submittals will be acceptable as an alternative to the paper copies listed in the Table above, provided a single hard-copy PDF based record set is provided to the Contracting Officer for record purposes. Where the contract requires the Contractor to submit documents to permitting authorities, still provide those authorities paper copies (or in an alternate format where required by the authority). Web based design submittal information shall be provided with adequate security and availability to allow unlimited access those specifically authorized to Government reviewers while preventing unauthorized access or modification. File sizes must be of manageable size for reviewers to quickly download or open on their computers. As a minimum, drawings shall be full scale on American National Standards Institute (ANSI) D sheets (34" x 22"). In addition to the optional website, provide the BIM data submission on DVD to each activity and address noted above in paragraph 3.9.1 for each BIM submission required in Attachment F.

3.9.3. Mailing of Design Submittals

3.9.3.1. Mail all design submittals to the Government during design and construction, using an overnight mailing service. The Government will furnish the Contractor addresses where each copy shall be mailed to after award of the contract (or individual task order if this is an indefinite delivery/indefinite quantity, task order contract). Mail the submittals to twenty one (21) different addresses. Assemble drawing sheets, specs, design analyses, etc. into individual sets; do not combine duplicate pages from individual sets so that the government has to assemble a set.

3.9.3.2. Each design submittal shall have a transmittal letter accompanying it indicating the date, design percentage, type of submittal, list of items submitted, transmittal number and point of contact with telephone number.

3.9.3.3. Provide partial sets of drawings, specifications, design analyses, etc., as designated in the Table in paragraph 3.9.1, to those reviewers who only need to review their applicable portions of the design, such as the various utilities. The details of which office receives what portion of the design documentation will be worked out after award.

3.10. AS-BUILT DOCUMENTS

Provide as-built drawings and specifications in accordance with Section 01 78 02.00 10, CLOSEOUT SUBMITTALS. Update LEED design phase documentation during construction as needed to reflect construction changes and advancing project completion status (example - Commissioning Plan updates during construction phase) and include updated LEED documentation in construction closeout submittal.

ATTACHMENT A STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS

1.0 GENERAL INFORMATION

Structural Interior Design includes all building related elements and components generally part of the building itself, such as wall finishes, ceilings finishes, floor coverings, marker/bulletin boards, blinds, signage and built in casework. Develop the SID in conjunction with the furniture footprint.

2.0 STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS FOR THE INTERIM AND FINAL DESIGN SUBMITTALS

2.1. FORMAT AND SCHEDULE

Prepare and submit for approval an interior and exterior building finishes scheme for an interim design submittal. The DOR shall meet with and discuss the finish schemes with the appropriate Government officials prior to preparation of the schemes to be presented. Present original sets of the schemes to reviewers at an interim design conference.

At the conclusion of the interim phase, after resolutions to the comments have been agreed upon between DOR and Government reviewers, the Contractor may proceed to final design with the interior finishes scheme presented.

The SID information and samples are to be submitted in 8 ½" x 11" format using three ring binders with pockets on the inside of the cover. When there are numerous pages with thick samples, use more than one binder. Large D-ring binders are preferred to O-ring binders. Use page protectors that are strong enough to keep pages from tearing out. Anchor large or heavy samples with mechanical fasteners, Velcro, or double-faced foam tape rather than rubber cement or glue. Fold out items must have a maximum spread of 25 ½". Provide cover and spine inserts sheets identifying the document as "Structural Interior Design" package. Include the project title and location, project number, Contractor/A/E name and phone number(s), submittal stage and date.

Design submittal requirements include, but are not limited to:

2.1.1. Narrative of the Structural Interior Design Objectives

The SID shall include a narrative that discusses the building related finishes. Include topics that relate to base standards, life safety, sustainable design issues, aesthetics, durability and maintainability, discuss the development and features as they relate to the occupants requirements and the building design.

2.1.2. Interior Color Boards

Identify and key each item on the color boards to the contract documents to provide a clear indication of how and where each item will be used. Arrange finish samples to the maximum extent possible by room type in order to illustrate room color coordination. Label all samples on the color boards with the manufacturer's name, patterns and colors name and number. Key or code samples to match key code system used on contract drawings.

Material and finish samples shall indicate true pattern, color and texture. Provide photographs or colored photocopies of materials or fabrics to show large overall patterns in conjunction with actual samples to show the actual colors. Finish samples must be large enough to show a complete pattern or design where practical.

Color boards shall include but not be limited to original color samples of the following:

All walls finishes and ceiling finishes, including corner guards, acrylic wainscoting and wall guards/chair rail finishes

All tile information, including tile grout color and tile patterns.

- All flooring finishes, including patterns.
- All door, door frame finishes and door hardware finishes
- All signage, wall base, toilet partitions, locker finishes and operable/folding partitions and trim

- All millwork materials and finishes (cabinets, counter tops, etc.)
- All window frame finishes and window treatments (sills, blinds, etc.)

Color board samples shall reflect all actual finish textures, patterns and colors required as specified. Patterned samples shall be of sufficient size to adequately show pattern and its repeat if a repeat occurs.

2.1.3. Exterior Color Boards

Prepare exterior finishes color boards in similar format as the interior finishes color boards, for presentation to the reviewers during an interim design conference. Provide original color samples of all exterior finishes including but not limited to the following:

- All Roof Finishes
- All Brick and Cast Stone Samples
- All Exterior Insulation and Finish Samples
- All Glass Color Samples
- All Exterior Metals Finishes
- All Window & Door Frame Finishes
- All Specialty Item Finishes, including trim

Identify each item on the exterior finishes color boards and key to the building elevations to provide a clear indication of how and where each item will be used.

2.2. STRUCTURAL INTERIOR DESIGN DOCUMENTS

2.2.1. General

Structural interior design related drawings must indicate the placement of extents of SID material, finishes and colors and must be sufficiently detailed to define all interior work. The following is a list of minimum requirements:

2.2.2. Finish Color Schedule

Provide finish color schedule(s) in the contract documents. Provide a finish code, material type, manufacturer, series, and color designations. Key the finish code to the color board samples and drawings.

2.2.3. Interior Finish Plans

Indicate wall and floor patterns and color placement, material transitions and extents of interior finishes.

2.2.4. Furniture Footprint Plans

Provide furniture footprint plans showing the outline of all freestanding and systems furniture for coordination of all other disciplines.

2.2.5. Interior Signage

Include interior signage plans or schedules showing location and quantities of all interior signage. Key each interior sign to a quantitative list indicating size, quantity of each type and signage text.

2.2.6. Interior Elevations, Sections and Details

Indicate material, color and finish placement.

ATTACHMENT B FURNITURE, FIXTURES & EQUIPMENT (FF&E) REQUIREMENTS

1.0 FF&E REQUIREMENTS FOR THE INTERIM AND FINAL DESIGN SUBMITTALS

1.1. FORMAT AND SCHEDULE

Prepare and submit for approval a comprehensive FF&E scheme for an interim design submittal. The Contractor's interior designer, not a furniture dealer, shall develop the design. FF&E is the selection, layout, specification and documentation of furniture includes but is not limited to workstations, seating, tables, storage and shelving, filing, trash receptacles, clocks, framed artwork, artificial plants, and other accessories. Contract documentation is required to facilitate pricing, procurement and installation. The FF&E package is based on the furniture footprint developed in the Structural Interior Design (SID) portion of the interior design. Develop the FF&E package concurrently with the building design to ensure that there is coordination between the electrical outlets, switches, J-boxes, communication outlets and connections, and lighting as appropriate. In addition, coordinate layout with other building features such as architectural elements, thermostats, location of TV's, GF/GI equipment (for example computers, printers, copiers, shredders, faxes), etc. Locate furniture in front of windows only if the top of the item falls below the window and unless otherwise noted, do not attach furniture including furniture systems to the building. If project has SIPRNET and/or NIPRNET, coordinate furniture layout with SIPRNET and NIPRNET separation requirements. Verify that access required by DOIM for SIPRNET box and conduit is provided. The DOR shall interview appropriate Government personnel to determine FF&E requirements for furniture and furnishings prior to preparation of the scheme to be presented. Determine FFE items and quantities by, but not limited to: (1) the number of personnel to occupy the building, (2) job functions and related furniture/office equipment to support the job function, (3) room functions, (4) rank and grade. Present original sets of the scheme to reviewers at an interim design conference upon completion of the interim architectural submittal or three months prior to the submittal of the final FF&E package (whichever comes first).

Design may proceed to final with the FF&E scheme presented at the conclusion of the interim phase, after resolutions to the comments have been agreed upon between DOR and Government reviewers.

Provide six copies of the electronic versions of all documents upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first), to ensure adequate time for furniture acquisition. Provide unbound, electronic drawings in CAD and BIM. Provide all files needed to view complete drawings. Submit all text documents in Microsoft Word or Excel..

Submit four copies of the final and complete FF&E information and samples in 8 1/2" x 11" format using three ring binders with pockets on the inside of the cover upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first). Use more than one binder when there are numerous pages with thick samples. Large D-ring binders are preferred to O-ring binders. Use page protectors that are strong enough to keep pages from tearing out for upholstery and finish boards. Anchor large or heavy samples with mechanical fasteners, Velcro, or double-faced foam tape rather than rubber cement or glue. Fold out items must have a maximum spread of 25 1/2". Provide cover and spine inserts sheets identifying the document as "Furniture, Fixtures & Equipment" package and include the project title and location, project number, Contractor/A/E name and phone number(s), submittal stage and date.

Provide electronic copies of all documents upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first), to ensure adequate time for furniture acquisition. Provide six compact disks with all drawings files needed to view the complete drawings unbound and in the latest version AutoCAD. Provide six additional compact disks of all text documents in Microsoft Word or Excel.

Design submittal requirements include, but are not limited to:

1.1.1. Narrative of Interior Design Objectives

Provide a narrative description of the furniture, to include functional, safety and ergonomic considerations, durability, sustainability, aesthetics, and compatibility with the building design.

1.1.2. Furniture Order Form

Prepare one Furnishings Order Form for each item specified in the design. This form identifies all information required to order each individual item. In addition to the project name and location, project number, and submittal phase, the order form must include:

- (a) Furniture item illustration and code
- (b) Furniture item name
- (c) Job name, location, and date
- (d) General Services Administration (GSA) FSC Group, part, and section
- (e) Manufacturer, Product name and Product model number or National Stock Number (NSN)
- (f) Finish name and number (code to finish samples)
- (g) Fabric name and number, minimum Wyzenbeek Abrasion Test double rubs (code to fabric samples)
- (h) Dimensions
- (i) Item location by room number and room name
- (j) Quantity per room
- (k) Total quantity
- (l) Special instructions for procurement ordering and/or installation (if applicable)
- (m) Written Product Description: include a non-proprietary paragraph listing the salient features of the item to include but not limited to:
 - (1) required features and characteristics
 - (2) ergonomic requirements
 - (3) functional requirements
 - (4) testing requirements
 - (5) furniture style
 - (6) construction materials
 - (7) minimum warranty

The following is an example for “m” features and characteristics, ergonomic requirements and functional requirements:

Chair Description:

- (1) Mid-Back Ergonomic Task Chair
- (2) Pneumatic Gaslift; Five Star Base
- (3) Mesh Back; Upholstered Seat
- (4) Height and Width Adjustable Task Arms:
 - a. Arm Height: 6”- 11” (+-1/2”)
 - b. Arm Width: 2”– 4” adjustment
- (5) Height Adjustable Lumbar Support
- (6) Adjustable Seat Height 16”-21” (+- 1”)
- (7) Sliding Seat Depth Adjustment 15”-18” (+-1”)
- (8) Standard Hard Casters (for carpeted areas)
- (9) Overall Measurements:
 - a. Overall width: 25” - 27”
 - b. Overall depth: 25”– 28”

(10) Must have a minimum of the following adjustments (In addition to the above):

- a. 360 Degree Swivel
- b. Knee-Tilt with Tilt Tension
- c. Back angle
- d. Forward Tilt
- e. Forward Tilt and Upright Tilt Lock

For projects with systems furniture, also provide a written description of the following minimum requirements:

- (1) Type furniture systems (panel, stacking panels, spine wall, desk based system, or a combination)
- (2) Minimum noise reduction coefficient (NRC)
- (3) Minimum sound transfer coefficient (STC)
- (4) Minimum flame spread and smoke development
- (5) UL testing for task lighting and electrical system
- (6) Panel widths and heights and their locations (this may be done on the drawings) Worksurface types and sizes (this may be done on the drawings)
- (7) Worksurface edge type
- (8) Varying panel/cover finish materials and locations (locations may be shown on the drawings)
- (9) Storage requirements
- (10) Keyboard requirements
- (11) Lock and keying requirements
- (12) Accessory components (examples: tack boards, marker boards, paper management)
- (13) Electrical and communication raceway requirement; type, capacity and location (base, beltline, below and/or above beltline)
- (14) Locations of communication cables (base, beltline, below and/or above beltline, top channel)
- (15) Types of electrical outlets
- (16) Types of communication jacks; provided and installed by others
- (17) Locations of electrical outlets and communication jacks (this may be done on the drawings)
- (18) Type of cable (examples: Cat. 5, Cat. 6, fiber optic; UTP or STP, etc.) system needs to support; provided and installed by others

1.1.3. Alternate Manufacturer List

Provide a table consisting of major furniture items that lists the manufacturers products specified on the Order Form and two alternate manufacturers. Major furniture items include, but are not limited to, casegoods, furniture systems, seating, and tables. Organize matrix by item code and item name. Supply alternates that are available on GSA Schedule and meet the requirements of the Furniture Order Form. One of the two alternates must be from UNICOR if possible. Provide manufacturer name address, telephone number, product series and product name for each alternate manufacturer.

1.1.4. FF&E Procurement List

Provide a table that lists all FF&E furniture, mission unique equipment and building Contractor Furnished/Contractor Installed (CF/CI) items. Give each item a code and name and designate whether item will be procured as part of the FF&E furniture, mission unique equipment or the building construction contract. Use the item code to key all FF&E documents including location plans, color boards, data sheets, cost estimate, etc.

1.1.5. Points of Contact (POCs)

Provide a comprehensive list of POCs needed to implement the FF&E package. This would include but not be limited to appropriate project team members, using activity contacts, interior design representatives, construction contractors and installers involved in the project. In addition to name, address, phone, fax and email, include each contact's job function. Divide the FF&E package into different sections based on this listing, applies to order forms and cost estimates.

1.1.6. Color Boards

Provide color boards for all finishes and fabrics for all FF&E items. Finishes to be included but not limited to paint, laminate, wood finish, fabric, etc.

1.1.7. Itemized Furniture Cost Estimate

Provide an itemized cost estimate of furnishings keyed to the plans and specifications of products included in the package. This cost estimate should be based on GSA price schedules. The cost estimate must include separate line items for general contingency, installation, electrical hook-up for systems furniture or other furniture requiring hardwiring by a licensed electrician, freight charges and any other related costs. Installation and freight quotes from vendors should be use in lieu of a percentage allowance when available. Include a written statement that the pricing is based on GSA schedules. An estimate developed by a furniture dealership may be provided as support information for the estimate, but must be separate from the contractor provided estimate.

1.2. INTERIOR DESIGN DOCUMENTS

1.2.1. Overall Furniture and Area Plans

Provide floor Plans showing locations and quantities of all freestanding, and workstation furniture proposed for each floor of the building. Key each room to a large scale Furniture Placement Plan showing the furniture configuration, of all furniture. Provide enlarged area plans with a key plan identifying the area in which the building is located. Key all the items on the drawings by furniture item code. Do not provide manufacturer specific information such as product names and numbers on drawings, Drawings shall be non-proprietary. This is typical for FFE on all plans, including those mentioned below.

1.2.2. Workstation Plans

Show each typical workstation configuration in plan view, elevations or isometric view. Drawings shall illustrate panels and all major components for each typical workstation configuration. Identify workstations using the same numbering system as shown on the project drawings. Key components to a legend on each sheet which identifies and describes the components along with dimensions. Provide the plan, elevations and isometric of each typical workstation together on the same drawing sheet.

1.2.3. Panel Plans

Show panel locations and critical dimensions from finished face of walls, columns, panels including clearances and aisle widths. Key panel assemblies to a legend which shall include width, height, configuration of frames, panel fabric and finishes (if there are different selections existing within a project), powered or non-powered panel and wall mount locations.

1.2.4. Desk Plans

Provide typical free standing desk configurations in plan view, elevation or isometric view and identify components to clearly represent each desk configuration.

1.2.5. Reflected Ceiling Plans

Provide typical plans showing ceiling finishes and heights, lighting fixtures, heating ventilation and air conditioning supply and return, and sprinkler head placement for coordination of furniture.

1.2.6. Electrical and Telecommunication Plans

Show power provisions including type and locations of feeder components, activated outlets and other electrical components. Show locations and quantities of outlets for workstations. Clearly identify different outlets, i.e. electrical, LAN and telecommunication receptacles indicating each type proposed. Show wiring configuration, (circuiting, switching, internal and external connections) and provide as applicable.

1.2.7. Artwork Placement Plans

Provide an Artwork Placement Plan to show location of artwork, assign an artwork item code to each piece of artwork. As an alternative, artwork can be located on the Furniture Plans. Provide a schedule that identifies each piece by room name and number. Provide installation instructions; include mounting height.

1.2.8. Window Drapery Plans

Provide Interior Window Drapery Plans. Key each drapery treatment to a schedule showing color, pattern, material, drapery size and type, draw direction, location and quantities.

1.3. FURNITURE SELECTION

1.3.1. Select furniture from the GSA Schedules. Specify furniture available open market when an item is not available on the GSA Schedules. Provide justification for items not available on the GSA Schedules.

1.3.2. To the greatest extent possible when specifying furniture work within a manufacturer's family of furniture for selections, example: Steelcase, Turnstone, Brayton International, Metro, and Vecta are all Steelcase companies. Each alternate should also be specified from a manufacturer's family of furniture, example: first set of alternates would be specified from Knoll's family of furniture and the second from Herman Miller family of furniture. It may be necessary to make some selections from other than a manufacturer's family of furniture if costs are not reasonable for particular items, some items are not available or appropriate for the facility or the items are not on GSA Schedule. If this occurs, consider specifying product from an open line that is accessible by numerous dealerships. Select office furniture including case goods, tables, storage, seating, etc. that is compatible in style, finish and color. Select furniture that complies with ANSI/BIFMA and from manufacturer's standard product line as shown in the most recent published price list and/or amendment and not custom product.

1.4. CONSTRUCTION

1.4.1. Provide knee space at workstations and tables that is not obstructed by panels/legs that interfere with knee space of seated person and specify modesty panels at walls to be of a height or be hinged to allow access to building wall electrical outlets and communication jacks. Provide desks, storage and tables with leveling devices to compensate for uneven floors.

1.4.2. Specify workstations and storage of steel construction. Provide worksurface tops constructed to prevent warpage. Provide user friendly features such as radius edges. Do not use sharp edges and exposed connections and ensure the underside of desks, tables and worksurfaces are completely and smoothly finished. Provide abutting worksurfaces that mate closely and are of equal heights when used in side-by-side configurations in order to provide a continuous and level worksurface.

1.4.3. Drawers shall stay securely closed when in the closed position and protect wires from damage during drawer operation. Include a safety catch to prevent accidental removal when fully open

1.4.4. Unless otherwise noted, provide lockable desks and workstations, filing cabinets and storage. Key all locks within a one person office the same; key all one person offices within a building differently. If an office or open office area has more than one workstation, key all the workstations differently, but key all locks within an individual workstation the same. Use tempered glass glazing when glazing is required. Use light-emitting diode (LED)/solid state lighting where task lighting is required in furniture.

1.5. FINISHES AND UPHOLSTERY

1.5.1. Specify neutral colors for casegoods, furniture systems, storage and tables. Specify desk worksurfaces and table tops that are not too light or too dark in color and have a pattern to help hide soiling. Accent colors are

allowed in break and lounge areas. Keep placement of furniture systems panel fabric accent colors to a minimum. All finishes shall be cleanable with ordinary household cleaning solutions.

1.5.2. Use manufacturer's standard fabrics; including textile manufacturers fabrics that have been graded into the furniture manufactures fabric grades and are available through their GSA Schedule. Customers Own Material (COM) can be used in headquarter buildings in command suites with executive furniture. Coordinate specific locations with Corps of Engineers Interior Designer.

1.5.3. Specify seating upholstery that meets Wyzenbeek Abrasion Test, 55,000 minimum rubs. Specify a soil retardant finish for woven fabrics if Crypton or vinyl upholstery is not provided for seating in dining areas. Use manufacturer's standard fabrics. This includes textile manufacturers fabrics that have been graded into the furniture manufactures fabric grades and are available through their GSA Schedule. Specify upholstery and finish colors and patterns that help hide soiling. Specify finishes that can be cleaned with ordinary household cleaning solutions.

1.6. ACCESSORIES

1.6.1. Specify all accessories required for completely finished furniture installation. Provide filing cabinets and storage for office supplies. Provide tack surfaces at workstations with overhead storage. Provide tackable surfaces at workstations with overhead storage.

1.6.2. Not Used.

1.6.3. Workstations are to be equipped with stable keyboard trays that have height adjustability, tilting capability, including negative tilt, have a mouse pad at same height as the keyboard tray that can accommodate both left and right handed users, and retractable under worksurface.

1.7. MISSION UNIQUE EQUIPMENT

Funding for FF&E furniture items and mission unique equipment (MUE) items are from two different sources. Separate the designs and procurement documentation for FFE items and MUE. MUE includes, but is not limited to, items such as industrial shelving, workbenches, appliances, fitness equipment, IT equipment and supporting carts. The User will purchase and install mission unique equipment items, unless otherwise noted. Identify locations of known MUE items such as industrial shelving, workbenches, appliances, etc. for space planning purposes.

1.8. SUSTAINABILITY

1.8.1. For all designs provided regardless of facility type, make every effort to implement all aspects of sustainability to the greatest extent possible for all the selections made in the FF&E package. This includes but is not limited to the selection of products that consider: **Material Chemistry and Safety of Inputs** (What chemicals are used in the construction of the selections?); **Recyclability** (Do the selections contain recycled content?); **Disassembly** (Can the selections be disassembled at the end of their useful life to recycle their materials?).

1.8.2. Make selections to the greatest extent possible of products that possess current McDonough Braungart Design Chemistry ([MBDC](#)) certification or other "third-party" certified Cradle to Cradle program, Forest Stewardship Council (FSC) certification, GREENGAURD certification or similar "third-party" certified products consisting of low-emitting materials.

1.9. FURNITURE SYSTEMS

1.9.1. General.

Where appropriate, design furniture systems in open office areas. Coordinate style and color of furniture systems with other storage, seating, etc. in open office areas. Minimize the number of workstation typicals and the parts and pieces required for the design to assist in future reconfiguration and inventorying.

1.9.2. Connector Systems.

Specify a connector system that allows removal of a single panel or spine wall within a typical workstation configuration without requiring disassembly of the workstation or removal of adjacent panels. Specify connector

system with tight connections and continuous visual seals. When Acoustical panels are used, provide connector system with continuous acoustical seals. Specify concealed clips, screws, and other construction elements, where possible.

1.9.3. Panels and Spine Walls

Specify panels and spine walls with hinged or removable covers that permit easy access to the raceway when required but are securely mounted and cannot be accidentally dislodged under normal conditions. Panels shall be capable of structurally supporting more than 1 fully loaded component per panel per side. Raceways are to be an integral part of the panel and must be able to support lay-in cabling and have a large capacity for electrical and IT. Do not thread cables through the frame.

1.9.4. Electrical And Information/Technology (IT)

Design furniture with electrical systems that meets requirements of UL 1286 when powered panels are required and UL approved task lights that meet requirements of NFPA 70. Dependent on user requirements and Section 01 10 00, paragraph 3 requirements, it is recommended that workstation electrical and IT wiring entry come from the building walls to eliminate the use of power poles and access at the floor. Design electrical and IT systems that are easily accessed in the spine wall and panels without having to move return panels and components. Electrical and IT management will be easily accessible by removable wall covers which can be removed while workstation components are still attached. Specify connector system that has continuation of electrical and IT wiring within workstations and workstation to workstation.

1.9.5. Pedestals

Specify pedestals that are interchangeable from left to right, and right to left, and retain pedestal locking system capability.

1.10. EXECUTIVE FURNITURE

1.10.1. Design for executive furniture in command areas, coordinate specific locations with Corps of Engineers Interior Designer. Use upgraded furniture, upholsteries and finishes in command suites. This includes but is not limited to wood casegoods, seating and tables. Select executive furniture casegoods from a single manufacturer and style line, to include workstations, credenzas, filing, and storage, etc.

1.10.2. Specify furniture with wood veneer finish (except worksurfaces) with mitered solid wood edge of same wood type. Provide worksurface plastic laminate that closely matches adjacent wood veneer. Other executive office furniture such as seating, tables, executive conference room furniture, etc. shall be compatible in style, finish and color with executive furniture casegoods.

1.11. SEATING

1.11.1. General

Specify appropriate chair casters and glides for the floor finish where the seating is located. Universal casters that are appropriate for both hard surface flooring and carpet are preferred. All seating shall support up to a minimum of 250 lbs.

1.11.2. Desk and Guest Seating

Select ergonomic desk chairs with casters, non-upholstered adjustable arms, waterfall front, swivel, tilt, variable back lock, adjustable back height or adjustable lumbar support, pneumatic seat height adjustment, and padded, contoured upholstered seat and back. Desk and guest chair backs may be other than upholstered such as mesh fabric if it is ergonomically designed, forms to back and is comfortable. Depending on scale of desk chair provide seat pan forward and back adjustment to increase or decrease depth of seat pan. All desk chairs shall have an adjustable seat height range of 4 1/2", range to include 16 1/2"-20". Select guest chairs that are compatible in style, finish and color with the desk chairs.

1.11.3. Conference Room Seating

At tables, select ergonomic conference seating with casters, non-upholstered arms, waterfall front, swivel, tilt, pneumatic seat height adjustment, and padded, contoured seat and back, unless otherwise noted. Select arm height and/or design that allows seating to be moved up closely to the table top. Conference chair backs may be other than upholstered such as mesh fabric if it is ergonomically designed, forms to back and is comfortable. Perimeter conference chairs shall be compatible in style, finish and color with conference seating at the tables.

1.11.4. Lounge, Waiting and Reception Area Seating

Select seating with arms and cushioned, upholstered seat and back. In heavy use areas, arms shall be easily cleaned such as non-upholstered arms or upholstered arms with wood arm caps unless otherwise noted.

1.11.5. Break Room Seating

Select stackable seating that is easily cleaned. Seating shall be appropriate for table and counter heights as applicable with non-upholstered arms if arms are required. Chairs shall have metal legs and composite materials for seats.

1.11.6. Lounge, Waiting and Reception Furniture.

Design for end and coffee tables with plastic laminate tops that are compatible in style finish and color with the seating.

1.12. FILING AND STORAGE.

Select storage and shelving units that meet customer's functional load requirements for stored items. Specify counterweights for filing cabinets when required by the manufacturer for stability. File drawers shall allow only one drawer to be opened at a time. Provide heavy duty storage and shelving if information is not available.

1.13. TRAINING TABLES.

Don't use plastic laminate self edge. Training tables shall be reconfigurable, moveable and storable; lighter weight folding with dollies or casters as necessary. Specify dollies if required.

1.14. FURNITURE WARRANTIES.

Specify manufacturer's performance guarantees or warranties that include parts, labor and transportation as follows:

- Furniture System, unless otherwise noted – 10 year minimum
- Furniture System Task Lights – 2 year minimum, excluding bulbs
- Furniture System Fabric – 3 year minimum
- Desks - 10 year minimum
- Seating, unless otherwise noted - 10 year minimum
- Seating Mechanisms and Pneumatic Cylinders - 10 years
- Fabric - 3 years minimum
- Filing and Storage - 10 year minimum
- Tables, unless otherwise noted - 10 year minimum
- Table Mechanisms – 5 year
- Table Ganging Device - 1 year
- Items not listed above - 1 year minimum

ATTACHMENT C

TRACKING COMMENTS IN DRCHECKS

1.0 General

The Government and DB Contractor shall set up the project in Dr Checks. Throughout the design process, the parties shall enter, track, and back-check comments using the DrChecks system. Government reviewers enter design review comments into DrChecks. Designers of Record shall annotate comments timely and specifically to indicate exactly what action will be taken or why the action is not required. Comments considered critical by the conference participants shall be flagged as such.

2.0 DrChecks Review Comments

The Contractor and the Government shall monitor DrChecks to assure all comments are annotated and agreed to by the designers and reviewers prior to the next submittal. The DrChecks comments and responses shall be printed and included in the design analysis for record.

2.1. Conference participants (reviewers) will expect coordination between Design Analysis calculations and the submitted design. Reviewers will also focus on the design submittal's satisfaction of the contract requirements.

2.2. The Designers of Record shall answer each comment in DrChecks with a formal response prior to the next submittal, clearly indicating what action will be taken and what drawing/spec will change. Designers of Record are encouraged to directly contact reviewers to discuss and agree to the formal comment responses rather than relying only on DrChecks and review meetings to discuss comments. With the next design conference, reviewers will back-check answers to the comments against the submittal, in addition to reviewing additional design work.

2.3. Comments that, in the DB Contractor's opinion, require effort outside the scope of the contract shall be clearly indicated as such in DrChecks. The DB Contractor shall not proceed with work outside the contract until a modification to the contract is properly executed, if one is necessary.

3.0 DrChecks Initial Account Set-Up

To initialize an office's use of DrChecks, choose a contact person within the office to call the DrChecks Help Desk at 800-428-HELP, M-F, 8AM-5PM, Central time. This POC will be given an office password to distribute to others in the office. Individuals can then go to the hyperlink at <http://www.projnet.org> and register as a first time user. Upon registration, each user will be given a personal password to the DrChecks system.

3.1. Once the office and individuals are registered, the COE's project manager or lead reviewer will assign the individuals and/or offices to the specific project for review. At this point, persons assigned can make comments, annotate comments, and close comments, depending on their particular assignment.

4.0 DrChecks Reviewer Role

The Contractor is the technical reviewer and the Government is the compliance reviewer of the DB designers design documents. Each reviewer enters their own comments into the Dr Checks system. To enter comments:

4.1. Log into DrChecks.

4.2. Click on the appropriate project.

4.3. Click on the appropriate review conference. An Add comment screen will appear.

4.4. Select or fill out the appropriate sections (particularly comment discipline and type of document for sorting) of the comment form and enter the comment in the space provided.

4.5. Click the Add Comment button. The comment will be added to the database and a fresh screen will appear for the next comment you have.

- 4.6. Once comments are all entered, exit DrChecks by choosing “My Account” and then Logout.

5.0 DrChecks Comment Evaluation

The role of the designers of record is to evaluate and respond to the comments entered by the Government reviewers and by the DB Contractor. To respond to comments:

- 5.1. Log into DrChecks.
- 5.2. Click on the appropriate project.
- 5.3. Under “Evaluate” click on the number under “Pending”.
- 5.4. Locate the comments that require your evaluation. (Note: If you know the comment number you can use the Quick Pick window on your home page in DrChecks; enter the number and click on go.)
- 5.5. Select the appropriate evaluation (concur, non-concur, for information only, or check and resolve) and add the response.
- 5.6. Click on the Add button. The evaluation will be added to the database and a fresh screen will appear with the next comment.
- 5.7. Once evaluations are all entered, exit DrChecks by choosing “My Account” and then Logout.

6.0 DrChecks Back-check

At the following design conference, participants will back-check comment annotations against newly presented documents to verify that the designers' responses are acceptable and completed. The Contractor and Government reviewers shall either enter additional back-check comments, as necessary or close those that are resolved as a result of the design conferences:

- 6.1. Log into DrChecks.
- 6.2. Click on the appropriate project.
- 6.3. Under “My Backcheck” click on the number under “Pending”.
- 6.4. If you agree with the designer’s response select “Close Comment” and add a closing response if desired.
- 6.5. If you do not agree with the designer’s response or the submittal does not reflect the response given, select “Issue Open”, enter additional information.
- 6.6. Click on the Add button. The back-check will be added to the database and a fresh screen will appear with the next comment.
- 6.7. Once back-checks are all entered, exit DrChecks by choosing “My Account” and then Logout. The design is completed and final when there are no pending comments to be evaluated and there are no pending or open comments under back-check.

ATTACHMENT D
SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

Instructions: Use the information outlined in this document to provide the minimum requirement for development of Fire Protection and Life Safety Code submittals for all building projects. Additional and supplemental information may be used to further develop the code review. Insert N/A after criteria, which may be "not applicable".

1.0 SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

- 1.1. Project Name (insert name and location)
- 1.2. Applicable Codes and Standards
 - 1.2.1. Unified Facilities Criteria (UFC): 3-600-01, Design: Fire Protection Engineering For Facilities
 - 1.2.2. International Building Code (IBC) for fire resistance requirements, allowable floor area, building height limitations and building separation distance requirements, except as modified by UFC 3-600-01.
 - 1.2.3. National Fire Protection Association (NFPA) 101 Life Safety Code (latest edition), for building egress and life safety and applicable criteria in UFC 3-600-01.
 - 1.2.4. ADA and ABA Accessibility Guidelines. For Buildings and Facilities See Section 01 10 00, Paragraph 3 for facility specific criteria.
- 1.3. Occupancy Classification
IBC chapters 3 and 4
- 1.4. Construction Type
IBC chapter 6
- 1.5. Area Limitations
IBC chapter 5, table 503
- 1.6. Allowable Floor Areas
IBC section 503, 505
- 1.7. Allowable area increases
IBC section 506, 507
- 1.8. Maximum Height of Buildings
IBC section 504
- 1.9. Fire-resistive substitution
- 1.10. Occupancy Separations
IBC table 302.3.2
- 1.11. Fire Resistive Requirements
 - 1.11.1. Exterior Walls - [] hour rating, IBC table 601, 602
 - 1.11.2. Interior Bearing walls - [] hour rating
 - 1.11.3. Structural frame - [] hour rating
 - 1.11.4. Permanent partitions - [] hour rating

- 1.11.5. Shaft enclosures - [] hour rating
- 1.11.6. Floors & Floor-Ceilings - [] hour rating
- 1.11.7. Roofs and Roof Ceilings - [] hour rating
- 1.12. Automatic Sprinklers and others used to determine the need for automatic Extinguishing Equipment, Extinguishing Systems, Foam Systems, Standpipe
 - 1.12.1. UFC 3-600-01, chapters 4 and 6 systems, wet chemical systems, etc. State which systems are required and to what criteria they will be designed.
 - 1.12.2. UFC 3-600-01, Appendix B Occupancy Classification. Note the classification for each room. This may be accomplished by classifying the entire building and noting exceptions for rooms that differ (E.g. The entire building is Light Hazard except boiler room and storage rooms which are [], etc.)
 - 1.12.3. UFC 3-600-01, Chapter 3 Sprinkler Design Density, Sprinkler Design Area, Water Demand for Hose Streams (supply pressure and source requirements).
 - 1.12.4. UFC 3-600-01, Chapter 4 Coverage per sprinkler head. Extended coverage sprinkler heads are not permitted.
 - 1.12.5. Available Water Supply. Provide the results of the water flow tests showing the available water supply static pressure and residual pressure at flow. Based on this data and the estimated flow and pressure required for the sprinkler system, determine the need for a fire pump.
 - 1.12.6. NFPA 13, Para. 8.16.4.6.1. Provide backflow preventer valves as required by the local municipality, authority, or water purveyor. Provide a test valve located downstream of the backflow preventer for flow testing the backflow preventer at full system demand flow. Route the discharge to an appropriate location outside the building.
- 1.13. Kitchen Cooking Exhaust Equipment
Describe when kitchen cooking exhaust equipment is provided for the project. Type of extinguishing systems for the equipment should be provided. per NFPA 96. Show all interlocks with manual release switches, fuel shutoff valves, electrical shunt trips, exhaust fans, and building alarms.
- 1.14. Portable Fire Extinguishers, fire classification and travel distance. per NFPA 10
- 1.15. Enclosure Protection and Penetration Requirements. - Opening Protectives and Through Penetrations
 - 1.15.1. IBC Section 712, 715 and Table 715.3. Mechanical rooms, exit stairways, storage rooms, janitor [] hour rating. IBC Table 302.1.1
 - 1.15.2. Fire Blocks, Draft Stops, Through Penetrations and Opening Protectives
- 1.16. Fire Dampers. Describe where fire dampers and smoke dampers are to be used (IBC Section 716 and NFPA 90A). State whether isolation smoke dampers are required at the air handler.
- 1.17. Detection Alarm and Communication. UFC 3-600-01, (Chapter 5); NFPA 101 para. 3.4 (chapters 12-42); NFPA 72
- 1.18. Mass Notification. Describe building/facility mass notification system (UFC 4-021-01) type and type of base-wide mass notification/communication system. State whether the visible notification appliances will be combined with the fire alarm system or kept separate. (Note: Navy has taken position to combine visible notification appliances with fire alarm).
- 1.19. Interior Finishes (classification). NFPA 101.10.2.3 and NFPA 101.7.1.4
- 1.20. Means of Egress

- 1.20.1. Separation of Means of Egress, NFPA 101 chapters 7 and 12-42; NFPA101.7.1.3
- 1.20.2. Occupant Load, NFPA101.7.3.1 and chapters 12-42.
- 1.20.3. Egress Capacity (stairs, corridors, ramps and doors) NFPA101.7.3.3
- 1.20.4. Number of Means of Egress, NFPA101.7.4 and chapters 12-42.
- 1.20.5. Dead end limits and Common Path of Travel, NFPA 101.7.5.1.6 and chapters 12-42.
- 1.20.6. Accessible Means of Egress (for accessible buildings), NFPA101.7.5.4
- 1.20.7. Measurement of Travel Distance to Exits, NFPA101.7.6 and chapters 12-42.
- 1.20.8. Discharge from Exits, NFPA101.7.7.2
- 1.20.9. Illumination of Means of Egress, NFPA101.7.8
- 1.20.10. Emergency Lighting, NFPA101.7.9
- 1.20.11. Marking of Means of Egress, NFPA101.7.10
- 1.21. Elevators, UFC 3-600-01, Chapter 6; IBC and ASME A17.1 - 2000,(Safety Code for Elevators and Escalators)
- 1.22. Accessibility Requirements, ADA and ABA Accessibility Guidelines for Buildings and Facilities
- 1.23. Certification of Fire Protection and Life Safety Code Requirements. (Note: Edit the Fire team membership if necessary). Preparers of this document certify the accuracy and completeness of the Fire Protection and Life Safety features for this project in accordance with the attached completed form(s).
- 1.24. Designer of Record. Certification of Fire protection and Life Safety Code Requirements. (Note: Edit the Fire team members if necessary). Preparers of this document certify the accuracy and completeness of the Fire Protection and Life Safety features of this project.

Fire Protection Engineer of Record:

Signature and Stamp

Date

OR

Architect of Record:

Signature and Stamp

Date

Mechanical Engineer of Record:

Signature and Stamp

Date

Electrical Engineer of Record:

Signature/Date

ATTACHMENT E
LEED SUBMITTALS

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only	REQUIRED DOCUMENTATION	Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		FEATURE	DUE AT		DATE	REV
GENERAL						
		GENERAL - All calculations shall be in accordance with LEED 2.2 Reference Guide.				
		GENERAL: Obtain excel version of this spreadsheet at http://en.sas.usace.army.mil/enWeb/EngineeringCriteria . OCT09REV				
		GENERAL - For all credits, narrative/comments may be added to describe special circumstances or considerations regarding the project's credit approach.				
		GENERAL - Include all required LEED drawings indicated below in contract drawings with applicable discipline drawings, labeled For Reference Only.				
		NOTE: Each submittal indicated with "****" differs from LEED certified project submittals by either having a different due date or being an added submittal not required by GBCI. OCT09REV				
		OCT09REV GENERAL - Audit documentation may include but is not limited to what is indicated in this table.				
			Closeout	List of all Final Design submittals revised after final design to reflect actual closeout conditions. Revised Final Design submittals. - OR - Statement confirming that no changes have been made since final design that effect final design submittal documents.		Proj Engr (PE)
CATEGORY 1 - SUSTAINABLE SITES						
SSPR1		Construction Activity Pollution Prevention (PREREQUISITE)	**Final Design	List of drawings and specifications that address the erosion control, particulate/dust control and sedimentation control measures to be implemented.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			**Final Design	Narrative that indicates which compliance path was used (NPDES or Local standards) and describes the measures to be implemented on the project. If a local standard was followed, provide specific information to demonstrate that the local standard is equal to or more stringent than the NPDES program.		CIV
SS1		Site Selection	Final Design	Statement confirming that project does not meet any of the prohibited criteria.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	LEED Site plan drawing that shows all proposed development, line depicting boundary of all bodies of water and/or wetlands within 100 feet of project boundary and a line depicting 5' elevation above 100 year flood line that falls within project boundary. Not required if neither condition applies.		CIV
SS2		Development Density & Community Connectivity	Final Design	Option 1: LEED Site vicinity plan showing project site and surrounding development. Show density boundary or note drawing scale.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Table indicating, for project site and all surrounding sites within density radius (keyed to site vicinity plan), site area and building area. Project development density calculation. Density radius calculation. Development density calculation within density radius.		CIV
			Final Design	Option 2: LEED Site vicinity plan showing project site, the 1/2 mile community radius, pedestrian walkways and the locations of the residential development(s) and Basic Services surrounding the project site.		CIV
			Final Design	Option 2: List (including business name and type) of all Basic Services facilities within the 1/2 mile radius, keyed to site vicinity plan.		CIV
SS3		Brownfield Redevelopment	Final Design	Narrative describing contamination and the remediation activities included in project. Include statement indicating how site was determined to be a brownfield.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS4.1		Alternative Transportation: Public Transportation Access	Final Design	Statement indicating which option for compliance applies. State whether public transportation is existing or proposed and, if proposed, cite source of this information.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: LEED Site vicinity plan showing project site, mass transit stops and pedestrian path to them with path distance noted.		CIV
			Final Design	Option 2: LEED Site vicinity plan showing project site, bus stops and pedestrian path to them with path distance noted.		CIV
SS4.2		Alternative Transportation: Bicycle Storage & Changing Rooms	Final Design	FTE calculation. Bicycle storage spaces calculation. Shower/changing facilities calculation.		CIV
			Final Design	List of drawings that show the location(s) of bicycle storage areas. Statement indicating distance from building entrance.		CIV
			Final Design	List of drawings that show the location(s) of shower/changing facilities and, if located outside the building, statement indicating distance from building entrance.		ARC
SS4.3		Alternative Transportation: Low Emitting & Fuel Efficient Vehicles	Final Design	Statement indicating which option for compliance applies. FTE calculation. Statement indicating total parking capacity of site.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Low-emission & fuel-efficient vehicle calculation.		CIV

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PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
			Final Design	Option 1: List of drawings and specification references that show location and number of preferred parking spaces for low-emission & fuel-efficient vehicles and signage.		CIV
			Final Design	Option 1: Statement indicating quantity, make, model and manufacturer of low-emission & fuel-efficient vehicles to be provided. Statement confirming vehicles are zero-emission or indicating ACEEE vehicle scores.		CIV
			Final Design	Option 2: Low-emission & fuel-efficient vehicle parking calculation.		CIV
			Final Design	Option 2: List of drawings and specification references that show location and number of preferred parking spaces and signage.		CIV
			Final Design	Option 3: Low-emission & fuel-efficient vehicle refueling station calculation.		CIV
			Final Design	Option 3: List of drawings and specifications indicating location and number of refueling stations, fuel type and fueling capacity for each station for an 8-hour period.		CIV
			Closeout	Option 3: Construction product submittals indicating what was provided and confirming compliance with respect to fuel type and fueling capacity for each station for an 8-hour period.		CIV
SS4.4		Alternative Transportation: Parking Capacity	Final Design	Statement indicating which option for compliance applies.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Preferred parking calculation including number of spaces required, total provided, preferred spaces provided and percentage.		CIV
			Final Design	Option 2: FTE calculation. Preferred parking calculation including number of spaces provided, preferred spaces provided and percentage.		CIV
			Final Design	Options 1 and 2: List of drawings and specification references that show location and number of preferred parking spaces and signage.		CIV
			Final Design	Option 3: Narrative indicating number of spaces required and provided and describing infrastructure and support programs with description of project features to support them.		CIV
SS5.1		Site Development: Protect or Restore Habitat	**Final Design	Option 1: List of drawing and specification references that convey site disturbance limits.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			**Final Design	Option 2: LEED site plan drawing that delineates boundaries of each preserved and restored habitat area with area (sf) noted for each.		CIV
			**Final Design	Option 2: Percentage calculation of restored/preserved habitat to total site area. List of drawings and specification references that convey restoration planting requirements.		CIV
SS5.2		Site Development: Maximize Open Space	Final Design	Option 2: LEED site plan drawing delineating boundary of vegetated open space adjacent to building with areas of building footprint and designated open space noted.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS6.1		Stormwater Design: Quantity Control	Final Design	Statement indicating which option for compliance applies.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Indicate pre-development and post-development runoff rate(cfs) and runoff quantity (cf) -OR - Narrative describing site conditions, measures and controls to be implemented to prevent excessive stream velocities and erosion.		CIV
			Final Design	Option 2: Indicate pre-development and post-development runoff rate(cfs) and runoff quantity (cf). Indicate percent reduction in each.		CIV
SS6.2		Stormwater Design: Quality Control	Final Design	For non-structural controls, list all BMPs used and, for each, describe the function of the BMP and indicate the percent annual rainfall treated. List all structural controls and, for each, describe the pollutant removal and indicate the percent annual rainfall treated.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS7.1		Heat Island Effect: Non-Roof	**Final Design	LEED site plan drawing indicating locations and quantities of each paving type, including areas of shaded pavement. Percentage calculation indicating percentage of reflective/shaded/open grid area.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS7.2		Heat Island Effect: Roof	Final Design	Option 1: Percentage calculation indicating percentage of SRI compliant roof area. List of drawings and specification references that convey SRI requirements and roof slopes.		ARC

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			Final Design OCT09REV	Option 1: List of specified roof materials indicating, for each, product type, manufacturer, product name and identification if known, SRI value and roof slope. OCT09REV		ARC
			**Closeout OCT09REV	Option 1: List of installed roof materials indicating, for each, manufacturer, product name and identification, SRI value and roof slope.		PE
			Closeout	X Option 1: Manufacturer published product data or certification confirming SRI		PE
			Final Design	Option 2: Percentage calculation indicating percentage of vegetated roof area.		ARC
			Final Design	Option 3: Combined reflective and green roof calculation.		ARC
			Final Design OCT09REV	Option 3: List of specified roof materials indicating, for each, product type, manufacturer, product name and identification if known, SRI value and roof slope. OCT09REV		
			**Closeout OCT09REV	Option 3: List of installed roof materials indicating, for each, manufacturer, product name and identification, SRI value and roof slope.		PE
			Closeout	X Option 3: Manufacturer published product data or certification confirming SRI		PE
SS8		Light Pollution Reduction	Final Design	Interior Lighting: List of drawings and specification references that convey interior lighting requirements (location and type of all installed interior lighting, location of non-opaque exterior envelope surfaces, allowing confirmation that maximum candela value from interior fixtures does not intersect non-opaque building envelope surfaces). - OR - List of drawings and specification references that show automatic lighting controls that turn off non-essential lighting during non-business hours		ELEC
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		ELEC
			Final Design	Exterior Lighting: List of drawings and specification references that convey exterior lighting requirements (location and type of all site lighting and building façade/landscape lighting).		ELEC
			Final Design	Exterior Site Lighting Power Density (LPD): Tabulation for exterior site lighting indicating, for each location identification or description, units of measure, area or distance of the location, actual LPD using units consistent with ASHRAE 90.1, and the ASHRAE allowable LPD for that type of location. Percentage calculation of actual versus allowable LPD for all site lighting.		ELEC
			Final Design	Exterior Building Facade/Landscape Lighting Power Density (LPD): Tabulation for exterior building facade/landscape lighting indicating, for each location identification or description, units of measure, area or distance of the location, actual LPD using units consistent with ASHRAE 90.1, and the ASHRAE allowable LPD for that type of location. Percentage calculation of actual versus allowable LPD for all building facade/landscape lighting.		ELEC
			Final Design	Exterior Lighting IESNA Zone: Indicate which IESNA zone is applicable to the project.		ELEC
			Final Design	Exterior Lighting Site Lumen table indicating, for each fixture type, quantity installed, initial lamp lumens per luminaire, initial lamp lumens above 90 degrees from Nadir, total lamp lumens and total lamp lumens above 90 degrees. Percentage of site lamp lumens above 90 degrees from nadir to total lamp lumens.		ELEC
			Final Design	Exterior Lighting Narrative describing analysis used for addressing requirements for light trespass at site boundary and beyond.		ELEC
CATEGORY 2 – WATER EFFICIENCY						
WE1.1		Water Efficient Landscaping: Reduce by 50%	Final Design	Statement indicating which option for compliance applies.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Calculation indicating, for baseline and design case, total water applied, total potable water applied, total non-potable water applied. Design case percent potable water reduction. If nonpotable water is used, indicate source of nonpotable water.		CIV
			Final Design	List of landscape plan drawings.		CIV
			Final Design	Narrative describing landscaping and irrigation design strategies, including water use calculation methodology used to determine savings and, if non-potable water is used, specific information about source and available quantity.		CIV
WE1.2		Water Efficient Landscaping: No Potable Water Use or No Irrigation	Same as WE1.1	Same as WE1.1		CIV
WE2		Innovative Wastewater Technologies	Final Design	Statement confirming which option for compliance applies.		MEC

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			Final Design	Statement confirming which occupancy breakdown applies (default or special). For special occupancy breakdown, indicate source and explanation for ratio.		MEC
			Final Design	Occupancy calculation including male/female numbers for FTEs, visitors, students, customers, residential and other type occupants/users		MEC
			Final Design	Statement indicating percent of male restrooms with urinals. Statement indicating annual days of operation.		MEC
			Final Design	Baseline flush fixture calculation spreadsheet indicating, for each fixture type, gender, flush rate, daily uses per person for each occupant type identified in occupancy calculation and annual baseline flush fixture water usage.		MEC
			Final Design	Design case flush fixture calculation spreadsheet indicating, for each fixture type, gender, fixture manufacturer, fixture model number, flush rate, percent of occupants using this fixture type, daily uses per person for each occupant type identified in occupancy calculation and annual design case flush fixture water usage.		MEC
			Final Design	Option 1: If onsite non-potable water is used, identify source(s), indicate annual quantity from each source and indicate total annual quantity from all onsite non-potable water sources.		MEC
			Final Design	Option 1: Summary calculation indicating baseline annual water consumption, design case annual water consumption, non-potable annual water consumption and total percentage annual water savings.		MEC
			Final Design	Option 2: Statement confirming on-site treatment of all generated wastewater to tertiary standards and all treated wastewater is either infiltrated or used on-site.		MEC
			Final Design	Option 2: List of drawing and specification references that convey design of on-site wastewater treatment features.		CIV
			Final Design	Option 2: On-site water treatment quantity calculation indicating all on-site wastewater source(s), annual quantity treated, annual quantity infiltrated and annual quantity re-used on site from each source and totals for annual quantity treated, annual quantity infiltrated and annual quantity re-used on site from all sources.		CIV
			Final Design	Option 2: Wastewater summary calculation indicating design case annual flush fixture water usage, annual on-site water treatment and percentage sewage conveyance reduction.		MEC
			Final Design	Narrative describing project strategy for reduction of potable water use for sewage conveyance, including specific information on reclaimed water usage and treated wastewater usage.		MEC
WE3.1		Water Use Reduction: 20% Reduction	Final Design	Statement confirming which occupancy breakdown applies (default or special). For special occupancy breakdown, indicate source and explanation for ratio.		MEC
			Final Design	Occupancy calculation including male/female numbers for FTEs, visitors, students, customers, residential and other type occupants/users		MEC
			Final Design	Statement indicating percent of male restrooms with urinals. Statement indicating annual days of operation.		MEC
			Final Design	Baseline flush fixture calculation spreadsheet indicating, for each fixture type, gender, flush rate, daily uses per person for each occupant type identified in occupancy calculation and annual baseline flush fixture water usage.		MEC
			Final Design	Design case flush fixture calculation spreadsheet indicating, for each fixture type, gender, fixture manufacturer, fixture model number, flush rate, percent of occupants using this fixture type, daily uses per person for each occupant type identified in occupancy calculation and annual design case flush fixture water usage.		MEC
			Closeout	X Manufacturer published product data or certification confirming fixture water usage.		PE
WE3.2		Water Use Reduction: 30% Reduction	Same as WE3.1	Same as WE3.1		MEC
CATEGORY 3 – ENERGY AND ATMOSPHERE						
EAPR1		Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	**Final Design	**Owner's Project Requirements document		ALL
			**Final Design	**Basis of Design document for commissioned systems		MEC, ELEC
			**Final Design	**Commissioning Plan		MEC, ELEC

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			Closeout	Statement confirming all commissioning requirements have been incorporated into construction documents.		PE
			Closeout	Commissioning Report		PE
EAPR2		Minimum Energy Performance (PREREQUISITE)	Final Design	Statement listing the mandatory provisions of ASHRAE 90.1 that project meets relative to compliance with this prerequisite and indicating which compliance path was used.		MEC ELEC ARC
EAPR3		Fundamental Refrigerant Management (PREREQUISITE)	Final Design	Statement indicating which option for compliance applies.		MEC
			Final Design	Option 2: Narrative describing phase out plan, including specific information on phase out dates and refrigerant quantities.		MEC
EA1		Optimize Energy Performance	Final Design	Statement indicating which compliance path option applies.		MEC
			Final Design	Option 1: Statement confirming simulation software capabilities and confirming assumptions and methodology.		MEC
			Final Design	Option 1: General information including simulation program, principal heating source, percent new construction and renovation, weather file, climate zone and Energy Star Target Finder score.		MEC
			Final Design	Option 1: Space summary listing, for each building use, the conditioned area, unconditioned area and total area and include total area for each category		MEC
			Final Design	Option 1: List of all simulation output advisory message data and show difference between baseline and proposed design		MEC
			Final Design	Option 1: Comparison summary for energy model inputs including description of baseline and design case energy model inputs, showing both by element type		MEC
			Final Design	Option 1: Energy type summary listing, for each energy type, utility rate description, units of energy and units of demand		MEC
			Final Design	Option 1: Statement indicating whether project uses on-site renewable energy. If yes, list all sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost		MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, statement describing how exceptional calculation measure cost savings is determined		MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, for each exceptional calculation method indicate energy types and, for each energy type, annual energy savings, annual cost savings, and brief descriptive narrative		MEC
			Final Design	Option 1: Baseline performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand for all four orientations. For each orientation indicate total annual energy use for each orientation and total annual process energy use.		MEC
			Final Design	Option 1: Baseline energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design	Option 1: Proposed Design performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand, baseline annual and peak energy demand and percent savings. Indicate total annual energy use and total annual process energy use for both proposed design and baseline and percent savings.		MEC
			Final Design	Option 1: Proposed Design energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design	Option 1: Energy cost and consumption by energy type report indicating, for each energy type, proposed design and baseline annual use and annual cost, percent savings annual use and annual cost. Indicate for renewable energy annual energy generated and annual cost. Indicate exceptional calculations annual energy savings and annual cost savings. Indicate building total annual energy use, annual energy cost for proposed design and baseline and indicate percent savings annual energy use and annual energy cost.		MEC

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			Final Design	Option 1: Compliance summaries from energy simulation software. If software does not produce compliance summaries provide output summaries and example input summaries for baseline and proposed design supporting data in the tables. Output summaries must include simulated energy consumption by end use and total energy use and cost by energy type. Example input summaries should represent most common systems and must include occupancy, use pattern, assumed envelope component sizes and descriptive features and assumed mechanical equipment types and descriptive features		MEC
			Final Design	Option 1: Energy rate tariff from project energy providers (only if not using LEED Reference Guide default rates)		MEC
EA2.1		On-Site Renewable Energy	Final Design	Statement indicating which compliance path option applies.		ELEC
			Final Design	List all on-site renewable energy sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost. Indicate total annual energy use (all sources), total annual energy cost (all sources) and percent renewable energy cost.		ELEC MEC
			Final Design	Option 1: Indicate, for renewable energy, proposed design total annual energy generated and annual cost.		ELEC MEC
			Final Design	Option 2: Indicate CBECS building type and building gross area. Provide the following CBECS data: median annual electrical intensity, median annual non-electrical fuel intensity, average electric energy cost, average non-electric fuel cost, annual electric energy use and cost, annual non-electric fuel use and cost.		ELEC MEC
			Final Design	Option 2: Narrative describing renewable systems and explaining calculation method used to estimate annual energy generated, including factors influencing performance.		ELEC MEC
EA2.2		On-Site Renewable Energy	Same as EA2.1	Same as EA2.1		ELEC MEC
EA2.3		On-Site Renewable Energy	Same as EA2.1	Same as EA2.1		ELEC MEC
EA3		Enhanced Commissioning	**Final Design	**Owner's Project Requirements document (OPR)		ALL
			**Final Design	**Basis of Design document for commissioned systems (BOD)		ELEC MEC
			**Final Design	**Commissioning Plan		ELEC MEC
			Closeout	Statement confirming all commissioning requirements have been incorporated into construction documents.		PE
			Closeout	**Commissioning Report		PE
			**Final Design	Statement by CxA confirming Commissioning Design Review		
			Closeout	Statement by CxA confirming review of Contractor submittals for compliance with OPR and BOD		PE
			Closeout	**Systems Manual		PE
			Closeout	Statement by CxA confirming completion of O&M staff and occupant training		PE
			Closeout	**Scope of work for post-occupancy review of building operation, including plan for resolution of outstanding issues		PE
			**Predesign	Statement confirming CxA qualifications and contractual relationships relative to work on this project, demonstrating that CxA is an independent third party.		MEC
EA4		Enhanced Refrigerant Management	Final Design	Refrigerant impact calculation table with all building data and calculation values as shown in LEED 2.2 Reference Guide Example Calculations		MEC
			Final Design	Narrative describing any special circumstances or explanatory remarks OCT09REV		
			Closeout	X Cut sheets highlighting refrigerant data for all HVAC components.		PE
EA5		Measurement & Verification	Closeout	Statement indicating which compliance path option applies.		PE
			Closeout	Measurement and Verification Plan		PE
			Closeout	**Scope of work for post-occupancy implementation of M&V plan		PE
EA6		Green Power	Closeout	Statement indicating which compliance path option applies.		PE
			Closeout	Option 1: Indicate proposed design total annual electric energy usage		PE
			Closeout	Option 2: Indicate actual total annual electric energy usage		PE
			Closeout	Option 3: Calculation indicating building type, total gross area, median electrical intensity and annual electric energy use		PE

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			Closeout	Green power provider summary table indicating, for each purchase type, provider name, annual quantity green power purchased and contract term. Indicate total annual green power use and indicate percent green power		PE
			Closeout	Narrative describing how Green Power or Green Tags are purchased		PE
CATEGORY 4 – MATERIALS AND RESOURCES						
MRPR1		Storage & Collection of Recyclables (PREREQUISITE)	Final Design	Statement confirming that recycling area will accommodate recycling of plastic, metal, paper, cardboard and glass. Narrative indicating any other materials addressed and coordination with pickup.		ARC
MR1.1		Building Reuse: Maintain 75% of Existing Walls, Floors & Roof	**Final Design	If project includes a building addition, confirm that area of building addition does not exceed 2x the area of the existing building.		ARC
			**Final Design	Spreadsheet listing, for each building structural/envelope element, the existing area and reused area. Total percent reused.		ARC
MR1.2		Building Reuse: Maintain 95% of Existing Walls, Floors & Roof	Same as MR1.1	Same as MR1.1		ARC
MR1.3		Building Reuse: Maintain 50% of Interior Non-Structural Elements	**Final Design	If project includes a building addition, confirm that area of building addition does not exceed 2x the area of the existing building.		ARC
			**Final Design	Spreadsheet listing, for each building interior non-structural element, the existing area and reused area. Total percent reused.		ARC
MR2.1		Construction Waste Management: Divert 50% From Disposal	**Preconstruction	Waste Management Plan		PE
			**Construction Quarterly and Closeout	Spreadsheet calculations indicating material description, disposal/diversion location (or recycling hauler), weight, total waste generated, total waste diverted, diversion percentage		PE
			**Construction Quarterly and Closeout	OCT09REV		
			**Construction Quarterly and Closeout	Receipts/tickets for all items on spreadsheet		PE
MR2.2		Construction Waste Management: Divert 75% From Disposal	Same as MR2.1	Same as MR2.1		PE
MR3.1		Materials Reuse: 5%	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each reused/salvaged material, material description, source or vendor, cost. Total reused/salvaged materials percentage.		PE
MR3.2		Materials Reuse: 10%	Same as MR3.1	Same as MR3.1		PE
MR4.1		Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each recycled content material, material name/description, manufacturer, cost, post-consumer recycled content percent, pre-consumer recycled content percent, source of recycled content data. Total post-consumer content materials cost, total pre-consumer content materials cost, total combined recycled content materials cost, recycled content materials percentage.		PE
			Final Design or NLT Preconstruction	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV		PE
			Closeout	Manufacturer published product data or certification, confirming recycled content percentages in spreadsheet		PE
MR4.2		Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	Same as MR4.1	Same as MR4.1		PE
MR5.1		Regional Materials: 10% Extracted, Processed & Manufactured Regionally	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each regional material, material name/description, manufacturer, cost, percent compliant, harvest distance, manufacture distance, source of manufacture and harvest location data. Total regional materials cost, regional materials percentage.		PE
			Preconstruction OCT09REV	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV		PE
			Closeout	Manufacturer published product data or certification confirming regional material percentages in spreadsheet		PE

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MR5.2		Regional Materials:20% Extracted, Processed & Manufactured Regionally	Same as MR5.1	Same as MR5.1	PE
MR6		Rapidly Renewable Materials	Closeout	Statement indicating total materials value and whether default or actual.	PE
			Closeout	Spreadsheet calculations indicating, for each rapidly renewable material, material name/description, manufacturer, cost, rapidly renewable content percent, rapidly renewable product value. Total rapidly renewable product value, rapidly renewable materials percentage.	PE
			Final Design OCT09REV	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV	ARC
			Closeout X	Manufacturer published product data or certification confirming rapidly renewable material percentages in spreadsheet	PE
MR7		Certified Wood	Closeout	Statement indicating total materials value and whether default or actual.	PE
			Closeout	Spreadsheet calculations indicating, for each certified wood material, material name/description, vendor, cost, wood component percent, certified wood percent of wood component, FSC chain of custody certificate number. Total certified wood product value, certified wood materials percentage.	PE
			Final Design or NLT Preconstruction	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV	PE
			Closeout X	Vendor invoices, FSC chain of custody certificates and manufacturer published product data or certification confirming all certified wood materials percentages in spreadsheet.	PE
CATEGORY 5 – INDOOR ENVIRONMENTAL QUALITY					
EQPR1		Minimum IAQ Performance (PREREQUISITE)	Final Design	Statement indicating which option for compliance applies, stating applicable criteria/requirement, and confirming that project has been designed to meet the applicable requirements.	MEC
			Final Design	Narrative describing the project's ventilation design, including specifics about fresh air intake volumes and special considerations.	MEC
EQPR2		Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	Final Design	Statement indicating which option for compliance applies, stating applicable criteria/requirement, and confirming that project has been designed to meet the applicable requirements.	ARC
			Final Design	List of drawing and specification references that convey conformance to applicable requirements (signage, exhaust system, room separation details, etc).	ARC
EQ1		Outdoor Air Delivery Monitoring	Final Design	Statement indicating which option for compliance applies and confirming that project has been designed to meet the applicable requirements.	MEC
			Final Design	List of drawing and specification references that convey conformance to applicable requirements.	MEC
			Final Design	Narrative describing the project's ventilation design and CO2 monitoring system, including specifics about monitors, operational parameters and setpoints.	MEC
			Closeout X	Cut sheets for CO2 monitoring system.	PE
EQ2		Increased Ventilation	Final Design	Statement indicating which option for compliance applies and confirming that project has been designed to meet the applicable requirements.	MEC
			Final Design	Narrative describing the project's ventilation design, including specifics about zone fresh air intake volumes and demonstrating compliance.	MEC
			Final Design	Option 2: Narrative describing design method used for determining natural ventilation design, including calculation methodology/model results and demonstrating compliance.	MEC
			Final Design	List of drawing and specification references that convey conformance to applicable requirements.	MEC
EQ3.1		Construction IAQ Management Plan: During Construction	**Preconstruction	Construction IAQ Management Plan	PE
			Closeout	Statement confirming whether air handling units were operated during construction	PE
			Closeout	Dated jobsite photos showing examples of IAQ management plan practices being implemented. Label photos to indicate which practice they demonstrate. Minimum one photo of each practice at each building.	PE
			Closeout	Spreadsheet indicating, for each filter installed during construction, the manufacturer, model number, MERV rating, location installed, and if it was replaced immediately prior to occupancy.	PE
EQ3.2		Construction IAQ Management Plan: Before Occupancy	**Preconstruction	Construction IAQ Management Plan	PE

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			Closeout	Statement indicating which option for compliance applies and confirming that required activities have occurred that meet the applicable requirements.		PE
			Closeout	Option 1a: Narrative describing the project's flushout process, including specifics about temperature, airflow and duration, special considerations (if any) and demonstrating compliance.		PE
			Closeout	Option 1b: Narrative describing the project's pre-occupancy and post-occupancy flushout processes, including specifics about temperature, airflow and duration, special considerations (if any) and demonstrating compliance.		PE
			Closeout	Option 2: Narrative describing the project's IAQ testing process, including specifics about contaminants tested for, locations, remaining work at time of test, retest parameters and special considerations (if any).		PE
			Closeout	Option 2: IAQ testing report demonstrating compliance.		PE
EQ4.1		Low Emitting Materials: Adhesives & Sealants	Closeout	Spreadsheet indicating, for each applicable indoor adhesive, sealant and sealant primer used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data.		PE
			Closeout	Spreadsheet indicating, for each applicable indoor aerosol adhesive, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data - OR - Statement confirming no indoor aerosol adhesives were used for the project.		PE
			Closeout	X Manufacturer published product data or certification confirming material VOCs in spreadsheet		PE
EQ4.2		Low Emitting Materials: Paints & Coatings	Closeout	Spreadsheet indicating, for each applicable indoor paint and coating used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data.		PE
			Closeout	Spreadsheet indicating, for each applicable indoor anti-corrosive/anti-rust paint and coating used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data - OR - Statement confirming no indoor anti-corrosive/anti-rust paints were used for the project .		PE
			Closeout	X Manufacturer published product data or certification confirming material VOCs in spreadsheet		PE
EQ4.3		Low Emitting Materials: Carpet Systems	Closeout	Spreadsheet indicating, for each indoor carpet used, the manufacturer, product name/model number, if it meets LEED requirement (yes/no) and source of LEED compliance data.		PE
			Closeout	Spreadsheet indicating, for each indoor carpet cushion used, the manufacturer, product name/model number, if it meets LEED requirement (yes/no) and source of LEED compliance data - OR - Statement confirming no indoor carpet cushion was used for the project.		PE
			Closeout	X Manufacturer published product data or certification confirming material CRI label in spreadsheet		PE
EQ4.4		Low Emitting Materials: Composite Wood & Agrifiber Products	Closeout	Spreadsheet indicating, for each indoor composite wood and agrifiber product used, the manufacturer, product name/model number, if it contains added urea formaldehyde (yes/no) and source of LEED compliance data.		PE
			Closeout	X Manufacturer published product data or certification confirming material urea formaldehyde in spreadsheet		PE
EQ5		Indoor Chemical & Pollutant Source Control	Closeout OCT09REV	Spreadsheet indicating, for each permanent entryway system used, the manufacturer, product name/model number and description of system. Roll-up and carpet systems requiring weekly cleaning to earn this credit are not a permitted option for Army projects.		PE
			Final Design	List of drawing and specification references that convey locations and installation methods for entryway systems.		ARC
			Final Design	Spreadsheet indicating, for each chemical use area, the room number, room name, description of room separation features (walls, floor/ceilings, openings) and pressure differential from surrounding spaces with doors closed - OR - Statement confirming that project includes no chemical use areas and that no hazardous cleaning materials are needed for building maintenance.		ARC MEC
			Final Design	If project includes chemical use areas: List of drawing and specification references that convey locations of chemical use areas, room separation features and exhaust system.		ARC MEC
			Closeout OCT09REV	If project includes chemical use areas: Spreadsheet indicating, for AHUs/mechanical ventilation equipment serving occupied areas, the manufacturer, model number, MERV rating, location installed, and if it was replaced immediately prior to occupancy (yes/no) - OR - Statement confirming that project does not use mechanical equipment for ventilation of occupied areas.		PE

Tuesday, October 19, 2010

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
EQ6.1		Controllability of Systems: Lighting	Final Design	Calculation indicating total number of individual workstations, number of workstations with individual lighting controls and the percentage of workstations with individual lighting controls.		ELEC
			Final Design	For each shared multi-occupant space, provide a brief description of lighting controls.		ELEC
			Final Design	Narrative describing lighting control strategy, including type and location of individual controls and type and location of controls in shared multi-occupant spaces.		ELEC
EQ6.2		Controllability of Systems: Thermal Comfort	Final Design	Calculation indicating total number of individual workstations, number of workstations with individual thermal comfort controls and the percentage of workstations with individual thermal comfort controls.		MEC
			Final Design	For each shared multi-occupant space, provide a brief description of thermal comfort controls.		MEC
			Final Design	Narrative describing thermal comfort control strategy, including type and location of individual and shared multi-occupant controls.		MEC
EQ7.1		Thermal Comfort: Design	Final Design	Design criteria spreadsheet indicating, for spring, summer, fall and winter, maximum indoor space design temperature, minimum indoor space design temperature and maximum indoor space design humidity.		MEC
			Final Design	Narrative describing method used to establish thermal comfort control conditions and how systems design addresses the design criteria, including compliance with the referenced standard.		MEC
EQ7.2		Thermal Comfort: Verification	Final Design	Narrative describing the scope of work for the thermal comfort survey, including corrective action plan development		MEC
EQ8.1		Daylight & Views: Daylight 75% of Spaces	Final Design	Option 1: Table indicating all regularly occupied spaces with space area and space area with 2% daylighting factor. Sum of regularly occupied areas and regularly occupied areas with 2% daylighting factor. Percentage calculation of areas with 2% daylighting factor to total regularly occupied areas.		ARC
			Final Design	Option 1: Glazing factor calculation table		ARC
			Final Design	Option 2: Simulation model method, software and output data		ARC
			Final Design	Option 2: Table indicating all regularly occupied spaces with space area, space area with minimum 25 footcandles daylighting illumination, and method of providing glare control. Sum of regularly occupied areas and regularly occupied areas with 25 fc daylighting. Percentage calculation of areas with 25 fc daylighting to total regularly occupied areas.		ARC
			Final Design	For all occupied spaces excluded from the calculation, provide narrative indicating reasons for excluding the space.		ARC
			Final Design	List of drawing and specification references that convey exterior glazed opening head and sill heights and glazing performance properties.		ARC
			Closeout	Manufacturer published product data or certification confirming glazing Tvis in spreadsheet		PE
EQ8.2		Daylight & Views: Views for 90% of Spaces	Final Design	Table indicating all regularly occupied spaces with space area and space area with access to views. Sum of regularly occupied areas and regularly occupied areas with access to views. Percentage calculation of areas with views to total regularly occupied areas.		ARC
			Final Design	For all occupied spaces excluded from the calculation, provide narrative indicating reasons for excluding the space.		ARC
			Final Design	LEED Floor plan drawings showing line of sight diagramming of views areas in each regularly occupied space. List of drawing/specification references that convey exterior glazed opening head and sill heights.		ARC
CATEGORY 6 – FACILITY DELIVERY PROCESS						
IDc1.1		Innovation in Design	Final Design OCT09REV	Narrative describing intent, requirement for credit, project approach to the credit. List of drawings and specification references that convey implementation of credit. All other documentation that validates claimed credit.		
IDc1.2		Innovation in Design	Final Design OCT09REV			
IDc1.3		Innovation in Design	Final Design OCT09REV			
IDc1.4		Innovation in Design	Final Design OCT09REV			
IDc2		LEED Accredited Professional	Final Design	Narrative indicating name of LEED AP, company name of LEED AP, description of LEED AP's role and responsibilities in the project.		ARC

ATTACHMENT F
Version 07-07-2010

BUILDING INFORMATION MODELING REQUIREMENTS

1.0 Section 1 - Submittal Format

1.1. Design Deliverables. Develop all designs using Building Information Modeling (BIM) and Computer Aided Design (CAD) software. Design submittal drawings shall be Full-Size size, suitable for half-size scaled reproduction.

2.0 Section 2 – Design Requirements

2.1. BIM Model and Facility Data. Contractor shall use BIM application(s) and software(s) to develop project designs. "Facility Data" is defined as associated intelligent attribute data. The "Model" is defined as 3D graphics that includes Facility Data and output as described in the paragraph 'Output' below. Contractors will use the Model to produce accurate Construction Documents. For each Center of Standardization (CoS) facility type included in this project, all BIM Models and associated Facility Data shall be submitted in Bentley Systems BIM i with associated USACE Bentley BIM Workspace (which includes specific standard BIM libraries and definitions). This Workspace can be downloaded from the CAD/BIM Technology Center. [Where available, the workspace will be specific to this CoS Facility Standard Design. The Contractor will be provided a baseline multi-discipline BIM Project Model for the CoS Facility Standard Design type, where such a model exists (for the purposes of site adaptation).] The USACE Bentley BIM Workspace is dependent on specific versions of the Bentley BIM suite of products and only the versions of the software that are listed in the Contractor instructions included with the USACE BIM Workspace are permitted to be used.

2.1.1. Reference. Refer to ERDC TR-06-10, "U.S. Army Corps of Engineers Building Information Modeling Road Map" from the CAD/BIM Technology Center website for more information on the USACE BIM implementation goals.

2.2. Drawings. Deliver CAD files used for the creation of the Construction Documents Drawings per requirements in Section 01 33 16, the criteria of the USACE Huntsville Center District, and as noted herein. Specification of a CAD file format for these Drawings does not limit which BIM application(s) or software(s) may be used for project development and execution.

2.2.1. IFC Support. The Contractor's selected BIM application(s) and software(s) must support the IFC (Industry Foundation Class - see www.iai-tech.org). Submit any deviations from or additions to the IFC property sets for any new spaces, systems, and equipment for Government approval.

2.2.2. Submittal Requirements. BIM submittals shall be fully interoperable, compatible, and editable with the Bentley BIM tools. Use the specified version of the USACE Bentley BIM Workspace and conform to the requirements of **Sections 3 and 4 below**.

2.2.3. BIM Project Execution Plan.

2.2.3.1. Develop a BIM Project Execution Plan ("Plan" or "PxP") documenting the BIM and analysis technologies selected for the Project Model (integrated with the AEC CAD Standard) from concept development through As-Builts as a design, production, coordination, construction, and documentation tool and the collaborative process by which it shall be executed. See Section 7 for additional guidance on developing the Plan.

2.2.4. BIM Requirements..

2.2.4.1. Facility Data. Develop the Facility Data consisting of a set of intelligent elements for the Model (e.g., doors, air handlers, electrical panels). This Facility Data shall include all material definitions and attributes that are necessary for the Project facility design and construction. Additional data in support of Section 6 Contractor Electives is encouraged.

2.2.4.2. Model Content. The Model and Facility Data shall include, at a minimum, the requirements of Section 4 below.

2.2.4.3. Model Granularity. Models may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on a quarter inch (1/4" = 1'0") scaled drawing (e.g. at least 1/16th, 1/8th and 1/4th), or appropriately scaled civil drawings.

2.2.4.4. Output. Submitted CAD drawings (e.g., plans, elevations, sections, schedules, details, etc.) shall be derived (commonly known as extractions, views or sheets) and maintained from the submitted Model and Facility Data.

2.3. Quality Control. Implement quality control (QC) parameters for the Model, including:

2.3.1. Model Standards Checks. QC validation used to ensure that the Project Facility Data set has no undefined, incorrectly defined or duplicated elements. Report non-compliant elements and corrective action plan to correct non-compliant elements. Provide the government with detailed justification and request government approval for any non-compliant element which the contractor proposes to be allowed to remain in the Model.

2.3.2. CAD Standards Checks. QC checking performed to ensure that the fonts, dimensions, line styles, levels and other construction document formatting issues are followed per the A/E/C CADD Standard.

2.3.3. Other Parameters. Develop such other QC parameters as Contractor deems appropriate for the Project and provide to the Government for concurrence.

2.4. Design and Construction Reviews. Perform design and construction reviews at each submittal stage under Section 3 to test the Model, including:

2.4.1. Visual Checks. Checking to ensure the design intent has been followed and that there are no unintended elements in the Model.

2.4.2. Interference Management Checks. Locate conflicting spatial data in the Model where two elements are occupying the same space. Log hard interferences (e.g., mechanical vs. structural or mechanical vs. mechanical overlaps in the same location) and soft interferences, (e.g., conflicts regarding equipment clearance, service access, fireproofing, insulation) in a written report and resolve.

2.4.3. IFC Coordination View. Provide an IFC Coordination View in IFC Express format for all deliverables. Provide exported property set data for all IFC supported named building elements.

2.4.4. Other Parameters. Develop such other Review parameters as the Contractor deems appropriate for the Project and provide to the Government for concurrence..

3.0 Section 3 – Design Stage Submittal Requirements

3.1. General Submittal Requirements.

3.1.1. Provide submittals in compliance with BIM Project Execution Plan deliverables at stages as described hereinafter.

3.1.2. At each Stage in Paragraphs 3.3 through 3.6, provide a Contractor-certified written report confirming that consistency checks as identified in Paragraphs 2.3 and 2.4 have been completed. This report shall be discussed as part of the review process and shall address cross-discipline interferences, if any.

3.1.3. At each Stage in Paragraphs 3.3 through 3.6, provide the Government with:

- The Model, Facility Data, Workspace and CAD Data files in native Bentley BIM/CAD.

- A 3-D interactive review format of the Model in Bentley Navigator, Autodesk Navisworks, Adobe 3D PDF 7.0 (or later), Google Earth KMZ or other format per Plan requirements. The file format for reviews can change between submittals.

- A list of all submitted files. The list should include a description, directory, and file name for each file submitted. For all CAD sheets, include the sheet title and sheet number. Identify files that have been produced from the submitted Model and Facility Data.

3.1.4. The Government will confirm acceptability of all submittals identified in Section 3 in coordination with the USACE Huntsville Center BIM Manager

3.2. Initial Design Conference Submittal.

3.2.1. Submit a digital copy of the Plan where, in addition to Paragraph 3.1.4, the USACE Geographic District BIM Manager will coordinate with the USACE CoS BIM Manager to confirm acceptability of the Plan or advise as to additional processes or activities necessary to be incorporated.

3.2.2. Within thirty (30) days after the approval of the Plan, conduct a demonstration to review the Plan for clarification, and to verify the functionality of Model technology workflow and processes. If modifications are required, the Contractor shall complete the modifications and resubmit the Plan and perform subsequent demonstration for Government acceptance. There will be no payment for design or construction until the Plan is acceptable to the Government. The Government may also withhold payment for design and construction for unacceptable performance in executing the approved Plan.

3.3. Interim Design Submittals.

3.3.1. BIM and CAD Data. The Model shall include the requirements identified in Paragraph 2.2.4 as applicable to the Interim Design package(s).

3.4. Final Design Submissions and Design Complete Submittals.

3.4.1. BIM and CAD Data. The Model shall include the requirements identified in Paragraph 2.2.4. Acceptance according to Paragraph 3.1.4 is required before commencement of construction, as described in Paragraph 3.7.6 of Section 01 33 16.

3.5. Construction Submittals – Over-The-Shoulder Progress Reviews. Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model, including interference management and design change tracking information.

3.6. Final As-Built BIM and CAD Data Submittal. Submit the final Model, Facility Data, and CAD files reflecting as-built conditions for Government Approval, as specified in Section 01 78 02.00 10, PROJECT CLOSEOUT.

4.0 Section 4 – BIM Model Minimum Requirements and Output

4.1. General Provisions. The deliverable Model shall be developed to include the systems described below as they would be built and the processes of installing them, and to reflect final as-built conditions. The deliverable model at the interim design stage and at the final design stage (“released for construction”) shall be developed to include as many of the systems described below as are necessary and appropriate at that design stage.

4.2. Architectural/Interior Design. The Architectural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing. Additional minimum Model requirements include:

4.2.1. Spaces. The Model shall include spaces defining accurate net square footage and net volume, and holding data for the room finish schedule for including room names and numbers. Include Programmatic Information provided by the Government or validated program to verify design space against programmed space, using this information to validate area quantities.

4.2.2. Walls and Curtain Walls. Each wall shall be depicted to the exact height, length, width and ratings (thermal, acoustic, fire) to properly reflect wall types. The Model shall include all walls, both interior and exterior, and the necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

4.2.3. Doors, Windows and Louvers. Doors, windows and louvers shall be depicted to represent their actual size, type and location. Doors and windows shall be modeled with the necessary intelligence to produce accurate window and door schedules.

4.2.4. Roof. The Model shall include the roof configuration, drainage system, penetrations, specialties, and the necessary intelligence to produce accurate plans, building sections and generic wall sections where roof design elements are depicted.

4.2.5. Floors. The floor slab shall be developed in the structural Model and then referenced by the architectural Model for each floor of the Project building.

4.2.6. Ceilings. All heights and other dimensions of ceilings, including soffits, ceiling materials, or other special conditions shall be depicted in the Model with the necessary intelligence to produce accurate plans, building sections and generic wall sections where ceiling design elements are depicted.

4.2.7. Vertical Circulation. All continuous vertical components (i.e., non-structural shafts, architectural stairs, handrails and guardrails) shall be accurately depicted and shall include the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.

4.2.8. Architectural Specialties and Woodwork. All architectural specialties (i.e., toilet room accessories, toilet partitions, grab bars, lockers, and display cases) and woodwork (i.e., cabinetry and counters) shall be accurately depicted with the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.

4.2.9. Signage. The Model shall include all signage and the necessary intelligence to produce accurate plans and schedules.

4.2.10. Schedules. Provide door, window, hardware sets using BHMA designations, flooring, wall finish, and signage schedules from the Model, indicating the type, materials and finishes used in the design.

4.3. Furniture. The furniture systems Model may vary in level of detail for individual elements within a Model, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing, and have necessary intelligence to produce accurate plans. Representation of furniture elements is to be 2D. Contractor may provide a minimal number of 3D representations as examples. Examples of furniture include, but are not limited to, desks, furniture systems, seating, tables, and office storage.

4.3.1. Furniture Coordination. Furniture that makes use of electrical, data or other features shall include the necessary intelligence to produce coordinated documents and data.

4.4. Equipment. The Model may vary in level of detail for individual elements within a Model. Equipment shall be depicted to meet layout requirements with the necessary intelligence to produce accurate plans and minimum schedules depicting their configuration. Examples of equipment include but are not limited to copiers, printers, refrigerators, ice machines and microwaves.

4.4.1. Schedules. Provide furniture and equipment schedules from the model indicating the materials, finishes, mechanical, and electrical requirements.

4.5. Structural. The structural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

4.5.1. Foundations. All necessary foundation and/or footing elements, with necessary intelligence to produce accurate plans and elevations

4.5.2. Floor Slabs. Structural floor slabs shall be depicted, including all necessary recesses, curbs, pads, closure pours, and major penetrations accurately depicted.

4.5.3. Structural Steel. All steel columns, primary and secondary framing members, and steel bracing for the roof and floor systems (including decks), including all necessary intelligence to produce accurate structural steel framing plans and related building/wall sections.

4.5.4. Cast-in-Place Concrete. All walls, columns, and beams, including necessary intelligence to produce accurate plans and building/wall sections depicting cast-in-place concrete elements.

4.5.5. Expansion/Contraction Joints. Joints shall be accurately depicted.

4.5.6. Stairs. The structural Model shall include all necessary openings and framing members for stair systems, including necessary intelligence to produce accurate plans and building/wall sections depicting stair design elements.

4.5.7. Shafts and Pits. The structural Model shall include all necessary shafts, pits, and openings, including necessary intelligence to produce accurate plans and building/wall sections depicting these design elements.

4.6. Mechanical. The mechanical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Small diameter (less than 1-1/2" NPS) field-routed piping is not required in the model. Additional minimum Model requirements include:

4.6.1. HVAC. All necessary heating, ventilating, air-conditioning and specialty equipment, including air distribution ducts for supply, return, and ventilation and exhaust ducts, including control system, registers, diffusers, grills and hydronic baseboards with necessary intelligence to produce accurate plans, elevations, building/wall sections and schedules.

4.6.1.1. Mechanical Piping. All necessary piping and fixture layouts, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, and schedules.

4.6.2. Plumbing. All necessary plumbing piping and fixture layouts, floor and area drains, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules.

4.6.3. Equipment Clearances. All HVAC and Plumbing equipment clearances shall be modeled for use in interference management and maintenance access requirements.

4.6.4. Elevator Equipment. The Model shall include the necessary equipment and control system, including necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

4.7. Electrical/Telecommunications. The electrical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Small diameter (less than 1-1/2"Ø) field-routed conduit is not required in the model. Additional minimum Model requirements include:

4.7.1. Interior Electrical Power and Lighting. All necessary interior electrical components (i.e., lighting, receptacles, special and general purpose power receptacles, lighting fixtures, panelboards, cable trays and control systems), including necessary intelligence to produce accurate plans, details and schedules. Lighting and power built into furniture/equipment shall be modeled.

4.7.2. Special Electrical Systems. All necessary special electrical components (i.e., security, Mass Notification, Public Address, nurse call and other special occupancies, and control systems), including necessary intelligence to produce accurate plans, details and schedules.

4.7.3. Grounding Systems. Grounding Systems. All necessary grounding components (i.e., lightning protection systems, static grounding systems, communications grounding systems, bonding), including necessary intelligence to produce accurate plans, details and schedules.

4.7.4. Communications. All existing and new communications service controls and connections, both above ground and underground with necessary intelligence to produce accurate plans, details and schedules. Cable tray routing shall be modeled without detail of cable contents.

4.7.5. Exterior Building Lighting. All necessary exterior lighting with necessary intelligence to produce accurate plans, elevations and schedules. The exterior building lighting Model shall include all necessary lighting, relevant existing and proposed support utility lines and equipment required with necessary intelligence to produce accurate plans, details and schedules.

4.7.6. Equipment Clearances. The model shall incorporate and define all electrical and communications working spaces, clearances, and required access

4.8. Fire Protection. The fire protection system Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

4.8.1. Fire Protection System. All relevant fire protection components (i.e., branch piping, sprinkler heads, fittings, drains, pumps, tanks, sensors, control panels) with necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules. All fire protection piping shall be modeled.

4.8.2. Fire Alarms. Fire alarm/mass notification devices and detection system shall be indicated with necessary intelligence to produce accurate plans depicting them.

4.9. Civil. The civil Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a one inch (1"=100') scaled drawing. Additional minimum Model requirements include:

4.9.1. Terrain (DTM). All relevant site conditions and proposed grading, including necessary intelligence to produce accurate Project site topographical plans and cross sections.

4.9.2. Drainage. All existing and new drainage piping, including upgrades thereto, including necessary intelligence to produce accurate plans and profiles for the Project site.

4.9.3. Storm Water and Sanitary Sewers. All existing and new sewer structures and piping, including upgrades thereto, on the Project site with necessary connections to mains or other distribution points as appropriate, including necessary intelligence to produce accurate plans and profiles for the Project site.

4.9.4. Utilities. All necessary new utilities connections from the Project building(s) to the existing or newly-created utilities, and all existing above ground and underground utility conduits, including necessary intelligence to produce accurate plans and site-sections.

4.9.5. Roads and Parking. All necessary roadways and parking lots or parking structures, including necessary intelligence to produce accurate plans, profiles and cross-sections.

5.0 Section 5 - Ownership and Rights in Data

5.1. Ownership. The Government has ownership of and rights at the date of Closeout Submittal to all CAD files, BIM Model, and Facility Data developed for the Project in accordance with FAR Part 27, clauses incorporated in Section 00 72 00, Contract Clauses and Special Contract Requirement 1.14 GOVERNMENT RE-USE OF DESIGN (Section 00 73 00). The Government may make use of this data following any deliverable.

6.0 Section 6 – Contractor Electives

6.1. Applicable Criteria. If the Contractor elected to include one or more of the following features as an elective in its accepted contract proposal for additional credit during the source selection, as described in the proposal submission requirements and evaluation criteria, the following criteria are requirements, as applicable to those elective feature(s).

6.2. COBIE Compliance. The Model and Facility Data for the Project shall fulfill Construction Operations Building Information Exchange (COBIE) requirements as defined by the Whole Building Design Guide organization, including all requirements for the indexing and submission of Portable Document Format (PDF) and other appropriate file formats that would otherwise be printed and submitted in compliance with Project operations and maintenance handover requirements.

6.3. Project Scheduling using the Model. In the BIM Execution Plan and during the Preliminary BIM Execution Plan Review, provide an overview of the use of BIM in the development and support of the project construction schedule.

6.3.1. Submittal Requirements. During the Submittal stages, the Contractor shall deliver the construction schedule with information derived from the Model.

6.3.1.1. Construction Submittals – Over-The-Shoulder Progress Reviews. Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model for project scheduling.

6.4. Cost Estimating. In the BIM Execution Plan and during the Preliminary BIM Execution Plan Review, provide an overview of the use of BIM in the development and support of cost estimating requirements, or other applications such as cost analysis and estimate validation.

6.4.1. Submittal Requirements. During the Submittal stages, the Contractor shall deliver cost estimating information derived from the Model.

6.4.2. Project completion. At project completion, the Contractor shall provide an MII (Micro Computer Aided Cost Estimating System Generation II) Cost Estimate which follows the USACE Cost Engineering Military Work Breakdown System (WBS), a modified Uniformat, to at least the sub-systems level and uses quantity information supplied directly from BIM output to the maximum extent possible, though other "Gap" quantity information will be included as necessary for a complete and accurate cost estimate.

6.4.2.1. Sub system level extracted quantities from the BIM for use within the estimate shall be provided according to how detailed line items or tasks should be installed/built so that accurate costs can be developed and/or reflected. Therefore, when developing a BIM, the designer shall be cognizant of what tasks need to be separated appropriately at the beginning stages of model development, such as tasks done on the first floor versus the same task on higher floors that will be more labor intensive and therefore need to have a separate quantity and be priced differently. Tasks and their extracted quantities from the BIM shall be broken down by their location (proximity in the structure) as well as the complexity of its installation.

6.4.2.2. At all design stages it shall be understood that BIM output as described in this document will not generate all quantities that are necessary in order to develop a complete and accurate cost estimate of the project based on the design. An example of this would be plumbing that is less than 1.5" diameter and therefore not expected to be modeled due to granularity; this information is commonly referred to as The Gap. Quantities from The Gap and their associated costs shall be included in the final project actual cost estimates as well.

6.5. Other Analyses and Reports. Structural, energy and efficiency, EPACT 2005 & EISA 2007, lighting design, daylighting, electrical power, psychrometric processing, shading, programming, LEED, fire protection, code compliance, Life Cycle Cost, acoustic, plumbing.

7.0 Section 7 – BIM Project Execution Plan Template

7.1. Contractors will utilize the latest version of the USACE BIM PROJECT EXECUTION PLAN (USACE PxP) Template to develop an acceptable Plan. The template can be downloaded from the CAD/BIM Technology Center website.

ATTACHMENT G**DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT**

Organize electronic design submittal files in a subdirectory/file structure in accordance with the following table. The Contractor may suggest a slightly different structure, subject to the discretion of the government.

Design Submittal Directory and Subdirectory File Arrangement.

Directory	Sub-Directory	Sub-Directory or Files	Files
Submittal/Package Name	Narratives	PDF file or files with updated design narrative for each applicable design discipline	
	Drawings	PDF (subdirectory)	Single PDF file with all applicable drawing sheets - bookmarked by sheet number and name
		BIM (subdirectory) See Attachment F.	BIM project folder (with files) per the USACE Workspace. Include an Excel drawing index file with each drawing sheet listed by sheet #, name and corresponding dgn file name (Final Design & Design Complete only)
	Design Analysis & Calculations	Individual PDF files containing design analysis and calculations for each discipline applicable to the submittal	
		PDF file with Fire Protection and Life Safety Code Review checklist	
	LEED	PDF file with updated Leed Check List	
		PDF file or files with LEED Templates for each point with applicable documentation included in each file.	
		LEED SUBMITTALS	
	Energy Analysis	PDF with baseline energy consumption analysis	
		PDF with actual building energy consumption analysis	
	Specifications	Single PDF file with table of contents and all applicable specifications sections.	
		Submittal Register (Final Design & Design Complete submittal only)	
	Design Quality Control	PDF file or files with DQC checklist(s) and/or statements	
	Building Rendering(s)	PDF file of rendering for each building type included in contract (Final Design & Design Complete).	

**SECTION 01 45 01.10
QUALITY CONTROL SYSTEM (QCS)**

1.0 GENERAL

- 1.1. CORRESPONDENCE AND ELECTRONIC COMMUNICATIONS
- 1.2. QCS SOFTWARE
- 1.3. SYSTEM REQUIREMENTS
- 1.4. RELATED INFORMATION
- 1.5. CONTRACT DATABASE
- 1.6. DATABASE MAINTENANCE
- 1.7. IMPLEMENTATION
- 1.8. DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM
- 1.9. MONTHLY COORDINATION MEETING
- 1.10. NOTIFICATION OF NONCOMPLIANCE

1.0 GENERAL

The Government will use the Resident Management System for Windows (RMS) to assist in its monitoring and administration of this contract. The Contractor shall use the Government-furnished Construction Contractor Module of RMS, referred to as QCS, to record, maintain, and submit various information throughout the contract period. The Contractor module, user manuals, updates, and training information can be downloaded from the RMS web site. This joint Government-Contractor use of RMS and QCS will facilitate electronic exchange of information and overall management of the contract. QCS provides the means for the Contractor to input, track, and electronically share information with the Government in the following areas:

- Administration
- Finances
- Quality Control
- Submittal Monitoring
- Scheduling
- Import/Export of Data
- Request for Information
- Accident Reporting
- Safety Exposure Manhours

1.1. CORRESPONDENCE AND ELECTRONIC COMMUNICATIONS

For ease and speed of communications, both Government and Contractor will exchange correspondence and other documents in electronic format. Correspondence, pay requests and other documents comprising the official contract record shall also be provided in paper format, with signatures and dates where necessary. Paper documents will govern, in the event of discrepancy with the electronic version.

1.2. OTHER FACTORS

Particular attention is directed to Contract Clause, "Schedules for Construction Contracts", Contract Clause, "Payments", Section 01 32 01.00 10, PROJECT SCHEDULE, Section 01 33 00, SUBMITTAL PROCEDURES, and Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL, which have a direct relationship to the reporting to be accomplished through QCS. Also, there is no separate payment for establishing and maintaining the QCS database; all costs associated therewith shall be included in the contract pricing for the work.

1.3. QCS SOFTWARE

QCS is a Windows-based program that can be run on a stand-alone personal computer or on a network. The Government will make available the QCS software to the Contractor after award of the construction contract. Prior to the Pre-Construction Conference, the Contractor shall be responsible to download, install and use the latest version of the QCS software from the Government's RMS Internet Website. Upon specific justification and request by the Contractor, the Government can provide QCS on CD-ROM. Any program updates of QCS will be made available to the Contractor via the Government RMS Website as they become available.

1.4. SYSTEM REQUIREMENTS

The following listed hardware and software is the minimum system configuration that the Contractor shall have to run QCS:

(a) Hardware

- IBM-compatible PC with 1000 MHz Pentium or higher processor
- 256 MB RAM for workstation / 512+ MB RAM for server
- 1 GB hard drive disk space for sole use by the QCS system
- Compact disk (CD) Reader, 8x speed or higher
- SVGA or higher resolution monitor (1024 x 768, 256 colors)
- Mouse or other pointing device
- Windows compatible printer (Laser printer must have 4+ MB of RAM)
- Connection to the Internet, minimum 56K BPS

(b) Software

- MS Windows 2000 or higher
- MS Word 2000 or newer
- Latest version of : Netscape Navigator, Microsoft Internet Explorer, or other browser that supports HTML 4.0 or higher
- Electronic mail (E-mail), MAPI compatible
- Virus protection software that is regularly upgraded with all issued manufacturer's updates

1.5. RELATED INFORMATION

1.5.1. QCS USER GUIDE

After contract award, the Contractor shall download instructions for the installation and use of QCS from the Government RMS Internet Website. In case of justifiable difficulties, the Government will provide the Contractor with a CD-ROM containing these instructions.

1.5.2. CONTRACTOR QUALITY CONTROL (CQC) TRAINING

The use of QCS will be discussed with the Contractor's QC System Manager during the mandatory CQC Training class.

1.6. CONTRACT DATABASE

Prior to the pre-construction conference, the Government will provide the Contractor with basic contract award data to use for QCS. The Government will provide data updates to the Contractor as needed, generally by using the government's SFTP repository built into QCS import/export function. These updates will generally consist of submittal reviews, correspondence status, QA comments, and other administrative and QA data.

1.7. DATABASE MAINTENANCE

The Contractor shall establish, maintain, and update data for the contract in the QCS database throughout the duration of the contract. The Contractor shall establish and maintain the QCS database at the Contractor's site office. Data updates to the Government, e.g., daily reports, submittals, RFI's, schedule updates, payment requests, etc. shall be submitted using the government's SFTP repository built into QCS export function. If permitted by the Contracting Officer, email or CD-ROM may be used instead (see Paragraph DATA SUBMISSION VIA CD-ROM). The QCS database typically shall include current data on the following items:

1.7.1. ADMINISTRATION

1.7.1.1. Contractor Information

The database shall contain the Contractor's name, address, telephone numbers, management staff, and other required items. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver Contractor administrative data in electronic format.

1.7.1.2. Subcontractor Information

The database shall contain the name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor must be listed separately for each trade to be performed. Each subcontractor/trade shall be assigned a unique Responsibility Code, provided in QCS. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver subcontractor administrative data in electronic format.

1.7.1.3. Correspondence

All Contractor correspondence to the Government shall be identified with a serial number. Correspondence initiated by the Contractor's site office shall be prefixed with "S". Letters initiated by the Contractor's home (main)

office shall be prefixed with "H". Letters shall be numbered starting from 0001. (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C".

All Requests For Information (RFI) shall be exchanged using the Built-in RFI generator and tracker in QCS.

1.7.1.4. Equipment

The Contractor's QCS database shall contain a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates.

1.7.1.5. Management Reporting

QCS includes a number of reports that Contractor management can use to track the status of the project. The value of these reports is reflective of the quality of the data input, and is maintained in the various sections of QCS. Among these reports are: Progress Payment Request worksheet, QA/QC comments, Submittal Register Status, Three-Phase Inspection checklists.

1.7.2. FINANCES

1.7.2.1. Pay Activity Data

The QCS database shall include a list of pay activities that the Contractor shall develop in conjunction with the design and construction schedule. The sum of all pay activities shall be equal to the total contract amount, including modifications. Pay activities shall be grouped by Contract Line Item Number (CLIN), and the sum of the activities shall equal the amount of each CLIN. The total of all CLINs equals the Contract Amount.

1.7.2.2. Payment Requests

All progress payment requests shall be prepared using QCS. The Contractor shall complete the payment request worksheet prompt payment certification, and payment invoice in QCS. The work completed under the contract, measured as percent or as specific quantities, shall be updated at least monthly. After the update, the Contractor shall generate a payment request report using QCS. The Contractor shall submit the payment request, prompt payment certification, and payment invoice with supporting data by using the government's SFTP repository built into QCS export function. If permitted by the Contracting Officer, E-mail or a CD-ROM may be used. A signed paper copy of the approved payment request is also required, which shall govern in the event of discrepancy with the electronic version.

1.7.3. Quality Control (QC)

QCS provides a means to track implementation of the 3-phase QC Control System, prepare daily reports, identify and track deficiencies, document progress of work, and support other contractor QC requirements. The Contractor shall maintain this data on a daily basis. Entered data will automatically output to the QCS generated daily report. The Contractor shall provide the Government a Contractor Quality Control (CQC) Plan within the time required in Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL. Within seven calendar days of Government acceptance, the Contractor shall submit a QCS update reflecting the information contained in the accepted CQC Plan: schedule, pay activities, features of work, submittal register, QC requirements, and equipment list.

1.7.3.1. Daily Contractor Quality Control (CQC) Reports

QCS includes the means to produce the Daily CQC Report. The Contractor may use other formats to record basic QC data. However, the Daily CQC Report generated by QCS shall be the Contractor's official report. Data from any supplemental reports by the Contractor shall be summarized and consolidated onto the QCS-generated Daily CQC Report. Daily CQC Reports shall be submitted as required by Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL. Reports shall be submitted electronically to the Government within 24 hours after the date covered by the report. The Contractor shall also provide the Government a signed, printed copy of the daily CQC report.

1.7.3.2. Deficiency Tracking

The Contractor shall use QCS to track deficiencies. Deficiencies identified by the Contractor will be numerically tracked using QC punch list items. The Contractor shall maintain a current log of its QC punch list items in the QCS database. The Government will log the deficiencies it has identified using its QA punch list items. The Government's QA punch list items will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of both QC and QA punch list items.

1.7.3.3. QC Requirements

The Contractor shall develop and maintain a complete list of QC testing and required structural and life safety special inspections required by the International Code Council (ICC), transferred and installed property, and user training requirements in QCS. The Contractor shall update all data on these QC requirements as work progresses, and shall promptly provide this information to the Government via QCS.

1.7.3.4. Three-Phase Control Meetings

The Contractor shall maintain scheduled and actual dates and times of preparatory and initial control meetings in QCS.

1.7.3.5. Labor and Equipment Hours

The Contractor shall log labor and equipment exposure hours on a daily basis. This data will be rolled up into a monthly exposure report.

1.7.3.6. Accident/Safety Tracking Reporting

The Government will issue safety comments, directions, or guidance whenever safety deficiencies are observed. The Government's safety comments will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of the safety comments. In addition, the Contractor shall utilize QCS to advise the Government of any accidents occurring on the jobsite. This supplemental entry is not to be considered as a substitute for completion of mandatory notification and reports, e.g., ENG Form 3394 and OSHA Form 300.

1.7.3.7. Features of Work

The Contractor shall include a complete list of the features of work in the QCS database. A feature of work may be associated with multiple pay activities. However, each pay activity (see subparagraph "Pay Activity Data" of paragraph "Finances") will only be linked to a single feature of work.

1.7.3.8. Hazard Analysis

The Contractor shall use QCS to develop a hazard analysis for each feature of work included in its CQC Plan. The hazard analysis shall address any hazards, or potential hazards, that may be associated with the work

1.7.4. Submittal Management

The Government will provide the submittal register form, ENG Form 4288, SUBMITTAL REGISTER, in electronic format. The Contractor and Designer of Record (DOR) shall develop and maintain a complete list of all submittals, including completion of all data columns and shall manage all submittals. Dates on which submittals are received and returned by the Government will be included in its export file to the Contractor. The Contractor shall use QCS to track and transmit all submittals. ENG Form 4025, submittal transmittal form, and the submittal register update, ENG Form 4288, shall be produced using QCS. QCS and RMS will be used to update, store and exchange submittal registers and transmittals, but will not be used for storage of actual submittals.

1.7.5. Schedule

The Contractor shall develop a design and construction schedule consisting of pay activities, in accordance with Section 01 32 01.00 10, PROJECT SCHEDULE, as applicable. This schedule shall be input and maintained in the QCS database either manually or by using the Standard Data Exchange Format (SDEF) (see Section 01 32 01.00 10 PROJECT SCHEDULE). The updated schedule data shall be included with each pay request submitted by the Contractor.

1.7.5.1. Import/Export of Data

QCS includes the ability to export Contractor data to the Government and to import submittal register and other Government-provided data from RMS, and schedule data using SDEF.

1.8. IMPLEMENTATION

Contractor use of QCS as described in the preceding paragraphs is mandatory. The Contractor shall ensure that sufficient resources are available to maintain its QCS database, and to provide the Government with regular database updates. QCS shall be an integral part of the Contractor's management of quality control.

1.9. DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM

The Government-preferred method for Contractor's submission of QCS data is by using the government's SFTP repository built into QCS export function.. Other data should be submitted using E-mail with file attachment(s). For locations where this is not feasible, the Contracting Officer may permit use of CD-ROM for data transfer. Data on CDs shall be exported using the QCS built-in export function. If used, CD-ROMs will be submitted in accordance with the following:

1.9.1. File Medium

The Contractor shall submit required data on CD-ROMs. They shall conform to industry standards used in the United States. All data shall be provided in English.

1.9.2. Disk Or Cd-Rom Labels

The Contractor shall affix a permanent exterior label to each diskette and CD-ROM submitted. The label shall indicate in English, the QCS file name, full contract number, contract name, project location, data date, name and telephone number of person responsible for the data.

1.9.3. File Names

The files will be automatically named by the QCS software. The naming convention established by the QCS software shall not be altered in any way by the Contractor.

1.10. MONTHLY COORDINATION MEETING

The Contractor shall update the QCS database each workday. At least monthly, the Contractor shall generate and submit an export file to the Government with schedule update and progress payment request. As required in Contract Clause "Payments", at least one week prior to submittal, the Contractor shall meet with the Government representative to review the planned progress payment data submission for errors and omissions.

The Contractor shall make all required corrections prior to Government acceptance of the export file and progress payment request. Payment requests accompanied by incomplete or incorrect data submittals will be returned. The Government will not process progress payments until an acceptable QCS export file is received.

1.11. NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this specification. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification.

End of Section 01 45 01.10

SECTION 01 45 04.00 10
CONTRACTOR QUALITY CONTROL

1.0 GENERAL

1.1. REFERENCES

1.2. PAYMENT

2.0 PRODUCTS (NOT APPLICABLE)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

3.2. QUALITY CONTROL PLAN

3.3. COORDINATION MEETING

3.4. QUALITY CONTROL ORGANIZATION

3.5. SUBMITTALS AND DELIVERABLES

3.6. CONTROL

3.7. TESTS

3.8. COMPLETION INSPECTION

3.9. DOCUMENTATION

3.10. NOTIFICATION OF NONCOMPLIANCE

1.0 GENERAL

1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Refer to the latest edition, as of the date of the contract solicitation.

- ASTM INTERNATIONAL (ASTM)
- ASTM D 3740 Minimum Requirements for Agencies
Engaged in the Testing and/or Inspection
of Soil and Rock as Used in Engineering
Design and Construction
- ASTM E 329 Agencies Engaged in the Testing
and/or Inspection of Materials Used in
Construction
- U.S. ARMY CORPS OF ENGINEERS (USACE)
ER 1110-1-12 Quality Management

1.2. PAYMENT

There will be no separate payment for providing and maintaining an effective Quality Control program. Include all costs associated therewith in the applicable unit prices or lump-sum prices contained in the Contract Line Item Schedule.

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product, which complies with the contract requirements. The system shall cover all design and construction operations, both onsite and offsite, and shall be keyed to the proposed design and construction sequence. The site project superintendent is responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager responsible for the overall construction activities at the site, including quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction related activities at the site.

3.2. QUALITY CONTROL PLAN

Furnish for Government review, not later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first 30 days of operation. Design and construction may begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. The Government will not permit work outside of the features of work included in an accepted interim plan to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started. Where the applicable Code issued by the International Code Council calls for an inspection by the Building Official, the Contractor shall include the inspections in the Quality Control Plan and shall perform the inspections. The Designer of Record shall develop a program for any special inspections required by the applicable International Codes and the Contractor shall perform these inspections, using qualified inspectors. Include the special inspection plan in the QC Plan.

3.2.1. Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all design and construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents subcontractors, designers of record, consultants, architect/engineers (AE), fabricators, suppliers, and purchasing agents:

3.2.1.1. A description of the quality control organization. Include a chart showing lines of authority and an acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. A CQC System Manager shall report to the project superintendent or someone higher in the contractor's organization.

3.2.1.2. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function. Also include those responsible for performing and documenting the inspections required by the International Codes and the special inspection program developed by the designer of record.

3.2.1.3. A copy of the letter to the CQC System Manager, signed by an authorized official of the firm, which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Furnish copies of these letters.

3.2.1.4. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents subcontractors, designers of record, consultants, architect engineers (AE), offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

3.2.1.5. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. Use only Government approved Laboratory facilities.

3.2.1.6. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

3.2.1.7. Procedures for tracking design and construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified deficiencies have been corrected.

3.2.1.8. Reporting procedures, including proposed reporting formats.

3.2.1.9. A list of the definable features of work. A definable feature of work is a task, which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the coordination meeting.

3.2.1.10. A list of all inspections required by the International Codes and the special inspection program required by the code and this contract.

3.2.2. Additional Requirements for Design Quality Control (DQC) Plan

The following additional requirements apply to the Design Quality Control (DQC) plan:

3.2.2.1. The Contractor's QCP Plan shall provide and maintain a Design Quality Control (DQC) Plan as an effective quality control program which will assure that all services required by this design-build contract are performed and provided in a manner that meets professional architectural and engineering quality standards. As a minimum, competent, independent reviewers identified in the DQC Plan shall review all documents. Use personnel who were not involved in the design effort to produce the design to perform the independent technical review (ITR). The ITR is intended as a quality control check of the design. Include, at least, but not necessarily limited to, a review of the contract requirements (the accepted contract or task order proposal and amended RFP), the basis of design, design calculations, the design configuration management documentation and check the design documents for

errors, omissions, and for coordination and design integration. The ITR team is not required to examine, compare or comment concerning alternate design solutions but should concentrate on ensuring that the design meets the contract requirements. Correct errors and deficiencies in the design documents prior to submitting them to the Government.

3.2.2.2. Include in the DQC Plan the discipline-specific checklists to be used during the design and quality control of each submittal. Submit these completed checklists at each design phase as part of the project documentation.

3.2.2.3. A Design Quality Control Manager, who has the responsibility of being cognizant of and assuring that all documents on the project have been coordinated, shall implement the DQC Plan. This individual shall be a person who has verifiable engineering or architectural design experience and is a registered professional engineer or architect. Notify the Government, in writing, of the name of the individual, and the name of an alternate person assigned to the position.

3.2.3. Acceptance of Plan

Government acceptance of the Contractor's plan is required prior to the start of design and construction. Acceptance is conditional and will be predicated on satisfactory performance during the design and construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.4. Notification of Changes

After acceptance of the CQC Plan, notify the Government in writing of any proposed change. Proposed changes are subject to Government acceptance.

3.3. COORDINATION MEETING

After the Postaward Conference, before start of design or construction, and prior to acceptance by the Government of the CQC Plan, the Contractor and the Government shall meet and discuss the Contractor's quality control system. Submit the CQC Plan for review a minimum of 7 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, design activities, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. The Government will prepare minutes of the meeting for signature by both parties. . The minutes shall become a part of the contract file. There may be occasions when either party will call for subsequent conferences to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4. QUALITY CONTROL ORGANIZATION

3.4.1. Personnel Requirements

The requirements for the CQC organization are a CQC System Manager, a Design Quality Manager, and sufficient number of additional qualified personnel to ensure contract compliance. The CQC organization shall also include personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly. The Contractor's CQC staff shall maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff shall be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly furnish complete records of all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2. CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System

Manager shall be a graduate engineer, graduate architect, or a BA/BS graduate of an ACCE accredited construction management college program. The CQC system Manager may alternately be an engineering technician with at least 2 years of college and an ICC certification as a Commercial Building Inspector (Residential Building Inspector certification will be required for Military Family Housing projects). In addition, the CQC system manager shall have a minimum of 5 years construction experience on construction similar to this contract. The CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. Assign the CQC System Manager no other duties (except may also serve as Safety and Health Officer, if qualified and if allowed by Section 00 73 00). Identify an alternate for the CQC System Manager in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager but the alternate may have other duties in addition to serving in a temporary capacity as the acting QC manager.

3.4.3. CQC Personnel

3.4.3.1. In addition to CQC personnel specified elsewhere in the contract provide specialized CQC personnel to assist the CQC System Manager in accordance with paragraph titled Area Qualifications.

3.4.3.2. These individuals may be employees of the prime or subcontractor; be responsible to the CQC System Manager; **are not intended to be full time, but must be physically present at the construction site during work on their areas of responsibility**; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan. **One person may cover more than one area, provided that they are qualified to perform QC activities for the designated areas below and provided that they have adequate time to perform their duties:**

3.4.4. Experience Matrix

3.4.4.1. Area Qualifications

3.4.4.1.1. Civil - Graduate Civil Engineer or (BA/BS) graduate in construction management with 4 years experience in the type of work being performed on this project or engineering technician with 5 yrs related experience.

3.4.4.1.2. Mechanical - Graduate Mechanical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or engineering technician with an ICC certification as a Commercial Mechanical Inspector with 5 yrs related experience.

3.4.4.1.3. Electrical - Graduate Electrical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or engineering technician with an ICC certification as a Commercial Electrical Inspector with 5 yrs related experience.

3.4.4.1.4. Structural - Graduate Structural Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or person with an ICC certification as a Reinforced Concrete Special Inspector and Structural Steel and Bolting Special Inspector (as applicable to the type of construction involved) with 5 yrs related experience.

3.4.4.1.5. Plumbing - Graduate Mechanical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience, or person with an ICC certification as a Commercial Plumbing Inspector with 5 yrs related experience.

3.4.4.1.6. Concrete, Pavements and Soils Materials Technician (present while performing tests) with 2 yrs experience for the appropriate area

3.4.4.1.7. Testing, Adjusting and Balancing Specialist must be a member (TAB) Personnel of AABC or an experienced technician of the firm certified by the NEBB (present while testing, adjusting, balancing).

3.4.4.1.8. Design Quality Control Manager Registered Architect or Professional Engineer (not required on the construction site)

3.4.4.1.9. Registered Fire Protection Engineer with 4 years related experience or engineering technician with 5 yrs related experience (but see requirements for Fire Protection Engineer of Record to witness final testing in Section 01 10 00, paragraph 5.10, Fire Protection).

3.4.4.1.10. QC personnel assigned to the installation of the telecommunication system or any of its components shall be Building Industry Consulting Services International (BICSI) Registered Cabling Installers, Technician Level. Submit documentation of current BICSI certification. In lieu of BICSI certification, QC personnel shall have a minimum of 5 years experience in the installation of the specified copper and fiber optic cable and components. They shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products. QC personnel shall witness and certify the testing of telecommunications cabling and equipment.

3.4.5. Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management for Contractors". This course is periodically offered at Fort Worth District, Corps of Engineers. Inquire of the District or Division sponsoring the course for fees and other expenses involved, if any, for attendance at this course.

3.4.6. Organizational Changes

When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5. SUBMITTALS AND DELIVERABLES

Make submittals as specified in Section 01 33 00 **SUBMITTAL PROCEDURES**. The CQC organization shall certify that all submittals and deliverables are in compliance with the contract requirements.

3.6. CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. The CQC organization shall conduct at least three phases of control for each definable feature of the construction work as follows:

3.6.1. Preparatory Phase

Perform this phase prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

3.6.1.1. A review of each paragraph of applicable specifications, reference codes, and standards. Make a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field at the preparatory inspection. Maintain these copies in the field, available for use by Government personnel until final acceptance of the work.

3.6.1.2. A review of the contract drawings.

3.6.1.3. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

3.6.1.4. Review of provisions that have been made to provide required control inspection and testing.

3.6.1.5. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

3.6.1.6. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

3.6.1.7. A review of the appropriate activity hazard analysis to assure safety requirements are met.

3.6.1.8. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

3.6.1.9. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

3.6.1.10. Discussion of the initial control phase.

3.6.1.11. Notify the Government at least 24 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2. Initial Phase

Accomplish this phase at the beginning of a definable feature of work. Include the following actions:

3.6.2.1. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

3.6.2.2. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

3.6.2.3. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

3.6.2.4. Resolve all differences.

3.6.2.5. Check safety to include compliance with and upgrading of the Accident Prevention plan and activity hazard analysis. Review the activity analysis with each worker.

3.6.2.6. Notify the Government at least 24 hours in advance of beginning the initial phase. The CQC System Manager shall prepare and attach to the daily CQC report separate minutes of this phase. Indicate exact location of initial phase for future reference and comparison with follow-up phases.

3.6.2.7. Repeat the initial phase any time acceptable specified quality standards are not being met.

3.6.3. Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Conduct final follow-up checks and correct deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

3.6.4. Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7. TESTS

3.7.1. Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements and project design documents. Upon request, furnish to the Government

duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory, or establish an approved testing laboratory at the project site. The Contractor may elect to use a laboratory certified and accredited by the Concrete and cement Reference Laboratory (CCRL) or by AASHTO Materials Reference Laboratory (AMRL) for testing procedures that those organizations certify. The Contractor shall perform the following activities and record and provide the following data:

3.7.1.1. Verify that testing procedures comply with contract requirements and project design documents.

3.7.1.2. Verify that facilities and testing equipment are available and comply with testing standards.

3.7.1.3. Check test instrument calibration data against certified standards.

3.7.1.4. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

3.7.1.5. Include results of all tests taken, both passing and failing tests, recorded on the CQC report for the date taken. Include specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2. Testing Laboratories

3.7.2.1. Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.2.2. Capability Recheck

If the selected laboratory fails the capability check, the Government will assess the Contractor a charge of \$1,375 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3. Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4. Furnishing or Transportation of Samples for Government Quality Assurance Testing

The Contractor is responsible for costs incidental to the transportation of samples or materials. Deliver samples of materials for test verification and acceptance testing by the Government to the Corps of Engineers Laboratory, f.o.b., at the following address:

- For delivery by mail:
Infrastructure/Community Resident Office
Shahrukh Shahzada
Bldg T-0071, Corner of Sapper & Velez Streets
Ft. Bliss, TX 79916
- For other deliveries:
Infrastructure/Community Resident Office

Shahrukh Shahzada

Bldg T-0071, Corner of Sapper & Velez Streets

Ft. Bliss, TX 79916

The area or resident office will coordinate, exact delivery location, and dates for each specific test.

3.8. COMPLETION INSPECTION

3.8.1. Punch-Out Inspection

Near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications, the CQC Manager shall conduct an inspection of the work. Prepare a punch list of items which do not conform to the approved drawings and specifications and include in the CQC documentation, as required by paragraph DOCUMENTATION. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2. Pre-Final Inspection

As soon as practicable after the notification above, the Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. Accomplish these inspections and any deficiency corrections required by this paragraph within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3. Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall attend the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups and major commands may also attend. The Government will formally schedule the final acceptance inspection based upon results of the Pre-Final inspection. Provide notice to the Government at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9. DOCUMENTATION

3.9.1. Maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers using government-provided software, QCS (see Section 01 45 01.10). The report includes, as a minimum, the following information:

3.9.1.1. Contractor/subcontractor and their area of responsibility.

3.9.1.2. Operating plant/equipment with hours worked, idle, or down for repair.

3.9.1.3. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

- 3.9.1.4. Test and/or control activities performed with results and references to specifications/drawings requirements. Identify the applicable control phase (Preparatory, Initial, Follow-up). List deficiencies noted, along with corrective action.
- 3.9.1.5. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- 3.9.1.6. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.
- 3.9.1.7. Offsite surveillance activities, including actions taken.
- 3.9.1.8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- 3.9.1.9. Instructions given/received and conflicts in plans and/or specifications.
- 3.9.1.10. Provide documentation of design quality control activities. For independent design reviews, provide, as a minimum, identity of the ITR team, the ITR review comments, responses and the record of resolution of the comments.
- 3.9.2. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. Furnish the original and one copy of these records in report form to the Government daily within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, submit one report for every 7 days of no work and on the last day of a no work period. Account for all calendar days throughout the life of the contract. The first report following a day of no work shall be for that day only. The CQC System Manager shall sign and date reports. The report shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel. The Contractor may submit these forms electronically, in lieu of hard copy.

3.10. NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

End of Section 01 45 04.00 10

**SECTION 01 50 02
TEMPORARY CONSTRUCTION FACILITIES**

1.0 OVERVIEW

- 1.1. GENERAL REQUIREMENTS
- 1.2. AVAILABILITY AND USE OF UTILITY SERVICES
- 1.3. BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN
- 1.4. PROTECTION AND MAINTENANCE OF TRAFFIC
- 1.5. MAINTENANCE OF CONSTRUCTION SITE

1.0 OVERVIEW

1.1. GENERAL REQUIREMENTS

1.1.1. Site Plan

Prepare a site plan indicating the proposed location and dimensions of any area to be fenced and used by the Contractor, the number of trailers to be used, avenues of ingress/egress to the fenced area and details of the fence installation. Identify any areas which may have to be graveled to prevent the tracking of mud. Also indicate if the use of a supplemental or other staging area is desired.

1.2. AVAILABILITY AND USE OF UTILITY SERVICES

1.2.1. See Section 00 72 00, Contract Clauses and Section 00 73 00, Special Contract Requirements, for Utility Availability requirements.

1.2.2. Sanitation

Provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer. Government toilet facilities will not be available to Contractor's personnel.

1.2.3. Telephone

Make arrangements and pay all costs for desired telephone facilities.

1.3. BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

1.3.1. Bulletin Board

Immediately upon beginning of onsite work, provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. Locate the bulletin board at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer. Display legible copies of the aforementioned data until work is completed. Remove the bulletin board from the site upon completion of the project.

1.3.2. Project and Safety Signs

Erect a project sign and a site safety sign with informational details as provided by the Government at the Post award conference, within 15 days prior to any work activity on project site. Update the safety sign data daily, with light colored metallic or non-metallic numerals. Remove the signs from the site upon completion of the project. Engineer Pamphlet EP 310-1-6a contains the standardized layout and construction details for the signs. It can be found through a GOOGLE Search or try <http://www.usace.army.mil/publications/eng-pamphlets/ep310-1-6a/s-16.pdf>.

1.4. PROTECTION AND MAINTENANCE OF TRAFFIC

Provide access and temporary relocated roads as necessary to maintain traffic. Maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Take measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, as required by the State and local authorities having jurisdiction. Protect the traveling public from damage to person and property.

The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. Investigate the adequacy of existing roads and the allowable load limit on these roads. Repair any damage to roads caused by construction operations.

1.4.1. Haul Roads

The Contractor shall, at its own expense, construct access and haul roads necessary for proper prosecution of the work under this contract. Construct haul roads with suitable grades and widths. Avoid sharp curves, blind corners, and dangerous cross traffic. Provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, shall be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval by the Contracting Officer. Provide adequate lighting to assure full and clear visibility for full width of haul road and work areas during any night work operations. Remove haul roads designated by the Contracting Officer upon completion of the work and restore those areas.

1.4.2. Barricades

Erect and maintain temporary barricades to limit public access to hazardous areas. Barricades shall be required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

1.5. MAINTENANCE OF CONSTRUCTION SITE

Mow grass and vegetation located within the boundaries of the construction site for the duration of the project, from NTP to contract completion. Edge or neatly trim grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers from NTP to contract completion.

End of Section 01 50 02

**SECTION 01 57 20.00 10
ENVIRONMENTAL PROTECTION**

1.0 GENERAL REQUIREMENTS

- 1.1. SUBCONTRACTORS
- 1.2. ENVIRONMENTAL PROTECTION PLAN
- 1.3. PROTECTION FEATURES
- 1.4. ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS
- 1.5. NOTIFICATION

2.0 PRODUCTS (NOT USED)

3.0 EXECUTION

- 3.1. LAND RESOURCES
- 3.2. WATER RESOURCES
- 3.3. AIR RESOURCES
- 3.4. CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL
- 3.5. RECYCLING AND WASTE MINIMIZATION
- 3.6. HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES
- 3.7. BIOLOGICAL RESOURCES
- 3.8. INTEGRATED PEST MANAGEMENT
- 3.9. PREVIOUSLY USED EQUIPMENT
- 3.10. MILITARY MUNITIONS
- 3.11. TRAINING OF CONTRACTOR PERSONNEL
- 3.12. POST CONSTRUCTION CLEANUP

1.0 GENERAL REQUIREMENTS

Minimize environmental pollution and damage that may occur as the result of construction operations. Protect the environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire duration of this contract. Comply with all applicable environmental Federal, State, and local laws and regulations. The Contractor shall be responsible for any delays resulting from failure to comply with environmental laws and regulations

1.1. SUBCONTRACTORS

Ensure compliance with this section by subcontractors.

1.2. ENVIRONMENTAL PROTECTION PLAN

1.2.1. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which the Contractor must address during construction. Define issues of concern within the Environmental Protection Plan as outlined in this section. Address each topic in the plan at a level of detail commensurate with the environmental issue and required construction task(s). Identify and discuss topics or issues which are not identified in this section, but which the Contractor considers necessary, after those items formally identified in this section. Prior to commencing construction activities or delivery of materials to the site, submit the Plan for review and Government approval. The Contractor shall meet with the Government prior to implementation of the Environmental Protection Plan, for the purpose of discussing the implementation of the initial plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the Contractor's Environmental Plans. Maintain and keep the Environmental Protection Plan current onsite.

1.2.2. Compliance

No requirement in this Section shall be construed as relieving the Contractor of any applicable Federal, State, and local environmental protection laws and regulations. During Construction, the Contractor shall be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

1.2.3. Contents

The plan shall include, but shall not be limited to, the following:

1.2.3.1. Name(s) of person(s) within the Contractor's organization who is(are) responsible for ensuring adherence to the Environmental Protection Plan.

1.2.3.2. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site, if applicable

1.2.3.3. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel

1.2.3.4. Description of the Contractor's environmental protection personnel training program

1.2.3.5. An erosion and sediment control plan which identifies the type and location of the erosion and sediment controls to be provided. Include monitoring and reporting requirements to assure that the control measures are in compliance with the erosion and sediment control plan, Federal, State, and local laws and regulations. A Storm Water Pollution Prevention Plan (SWPPP) may be substituted for this plan.

1.2.3.6. Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on the site

1.2.3.7. Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Include measures to minimize the amount of mud transported onto paved public roads by vehicles or runoff.

1.2.3.8. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Include measures for marking the limits of use areas including methods for protection of features to be preserved within authorized work areas.

1.2.3.9. Drawing showing the location of on-installation borrow areas.

1.2.3.10. A spill control plan shall include the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. The spill control plan supplements the requirements of EM 385-1-1. This plan shall include as a minimum:

- (a) The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual shall immediately notify the Government and the local Fire Department in addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity is released to the environment. The plan shall contain a list of the required reporting channels and telephone numbers.
- (b) The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup
- (c) Training requirements for Contractor's personnel and methods of accomplishing the training
- (d) A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.
- (e) The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency
- (f) The methods and procedures to be used for expeditious contaminant cleanup

1.2.3.11. A solid waste management plan identifying waste minimization, collection, and disposals methods, waste streams (type and quantity), and locations for solid waste diversion/disposal including clearing debris and C&D waste that is diverted (salvaged, reused, or recycled). Detail the contractor's actions to comply with, and to participate in, Federal, state, regional, local government, and installation sponsored recycling programs to reduce the volume of solid waste at the source. Identify any subcontractors responsible for the transportation, salvage and disposal of solid waste. Submit licenses or permits for solid waste disposal sites that are not a commercial operating facility. Attach evidence of the facility's ability to accept the solid waste to this plan. A construction and demolition waste management plan, similar to the plan specified in the UFGS 01 74 19 (formerly 01572) may be used as the non-hazardous solid waste management plan. Provide a Non-Hazardous Solid Waste Diversion Report. Submit the report on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted and each quarter thereafter (e.g. the first working day of January, April, July, and October) until the end of the project. Additionally, a summary report, with all data fields, is required at the end of the project. The report shall indicate the total type and amount of waste generated, total type and amount of waste diverted, type and amount of waste sent to waste-to-energy facility and alternative daily cover, in tons along with the percent that was diverted. Maintain, track and report construction and demolition waste data in a manner such that the installation can enter the data into the Army SWAR database, which separates data by type of material. A cumulative report in LEED Letter Template format may be used but must be modified to include the date disposed of/diverted and include the above stated diversion data. NOTE: The Solid Waste Diversion Reports are separate documentation than the LEED documentation.

1.2.3.12. DELETED.

1.2.3.13. An air pollution control plan detailing provisions to assure that dust, debris, materials, trash, etc., do not become air borne and travel off the project site.

1.2.3.14. A contaminant prevention plan that: identifies potentially hazardous substances to be used on the job site; identifies the intended actions to prevent introduction of such materials into the air, water, or ground; and details provisions for compliance with Federal, State, and local laws and regulations for storage and handling of

these materials. In accordance with EM 385-1-1, include a copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be on site at any given time in the contaminant prevention plan. Update the plan as new hazardous materials are brought on site or removed from the site. Reference this plan in the storm water pollution prevention plan, as applicable.

1.2.3.15. A waste water management plan that identifies the methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines. If a settling/retention pond is required, include the design of the pond including drawings, removal plan, and testing requirements for possible pollutants. If land application will be the method of disposal for the waste water, include a sketch showing the location for land application along with a description of the pretreatment methods to be implemented and any required permits. If surface discharge will be the method of disposal, include a copy of the permit and associated documents as an attachment prior to discharging the waste water. If disposal is to a sanitary sewer, include documentation that the waste water treatment plant Operator has approved the flow rate, volume, and type of discharge.

1.2.3.16. A historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on the project site: and/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in the area are discovered during construction. Include methods to assure the protection of known or discovered resources and shall identify lines of communication between Contractor personnel and the Government.

1.2.3.17. A pesticide treatment plan, updated, as information becomes available. Include: sequence of treatment, dates, times, locations, pesticide trade name, EPA registration numbers, authorized uses, chemical composition, formulation, original and applied concentration, application rates of active ingredient (i.e. pounds of active ingredient applied), equipment used for application and calibration of equipment. The Contractor is responsible for Federal, State, Regional and Local pest management record keeping and reporting requirements as well as any additional Installation specific requirements. Follow AR 200-1, Chapter 5, Pest Management, Section 5-4, "Program Requirements" for data required to be reported to the Installation.

1.3. PROTECTION FEATURES

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS. Prior to start of any onsite construction activities, the Contractor and the Government shall make a joint condition survey. Immediately following the survey, the Contractor shall prepare a brief report including a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. Both the Contractor and the Government will sign this survey, upon mutual agreement as to its accuracy and completeness. The Contractor develop a plan that depicts how it will protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference which their preservation may cause to the Contractor's work under the contract.

1.4. ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations, requested by the Contractor, from the drawings, plans and specifications which may have an environmental impact will be subject to approval by the Government and may require an extended review, processing, and approval time. The Government reserves the right to disapprove alternate methods, even if they are more cost effective, if the Government determines that the proposed alternate method will have an adverse environmental impact.

1.5. NOTIFICATION

The Government will notify the Contractor in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the Contractor's Environmental Protection plan. The Contractor shall, after receipt of such notice, inform the Government of the proposed corrective action and take such action when approved by the Government. The Government may issue an order stopping all or part of the

work until satisfactory corrective action has been taken. No time extensions shall be granted or equitable adjustments allowed to the Contractor for any such suspensions. This is in addition to any other actions the Government may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

2.0 PRODUCTS (NOT USED)

3.0 EXECUTION

3.1. LAND RESOURCES

Confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, identify any land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval. Do not attach or fasten any ropes, cables, or guys to any trees for anchorage unless specifically authorized. Provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Remove all stone, soil, or other materials displaced into uncleared areas..

3.1.1. Work Area Limits

Prior to commencing construction activities, mark the areas that need not be disturbed under this contract. Mark or fence isolated areas within the general work area which are not to be disturbed. Protect monuments and markers before construction operations commence. Where construction operations are to be conducted during darkness, any markers shall be visible in the dark. Personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

3.1.2. Landscape

Clearly identify trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved by marking, fencing, or wrapping with boards, or any other approved techniques. Restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

3.1.3. Erosion and Sediment Controls

Provide erosion and sediment control measures in accordance with Federal, State, and local laws and regulations. Coordinate with approving authorities (federal, state, etc.) for specific requirements to be included in the plan. The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's construction activities. Keep the area of bare soil exposed at any one time by construction operations to a minimum necessary. Construct or install temporary and permanent erosion and sediment control best management practices (BMPs). BMPs may include, but not be limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. Remove any temporary measures after the area has been stabilized.

3.1.4. Contractor Facilities and Work Areas

Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the Government. Make only approved temporary movement or relocation of Contractor facilities. Provide erosion and sediment controls for on-site borrow and spoil areas to prevent sediment from entering nearby waters. Control temporary excavation and embankments for plant and/or work areas to protect adjacent areas.

3.2. WATER RESOURCES

Monitor construction activities to prevent pollution of surface and ground waters. Do not apply toxic or hazardous chemicals to soil or vegetation unless otherwise indicated. Monitor all water areas affected by construction activities. For construction activities immediately adjacent to impaired surface waters, the Contractor shall be capable of quantifying sediment or pollutant loading to that surface water when required by state or federally issued Clean Water Act permits.

3.2.1. Stream Crossings

Stream crossings shall allow movement of materials or equipment without violating water pollution control standards of the Federal, State, and local governments or impede state-designated flows.

3.2.2. Wetlands

Do not enter, disturb, destroy, or allow discharge of contaminants into any wetlands.

3.3. AIR RESOURCES

Comply with all Federal and State air emission and performance laws and standards for equipment operation, activities, or processes.

3.3.1. Particulates

Control dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants, including weekends, holidays and hours when work is not in progress. Maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates which would cause the Federal, State, and local air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators or other methods are permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. Provide sufficient, competent equipment available to accomplish these tasks. Perform particulate control as the work proceeds and whenever a particulate nuisance or hazard occurs. Comply with all State and local visibility regulations.

3.3.2. Odors

Control odors from construction activities at all times. Odors shall not cause a health hazard and shall be in compliance with State regulations and/or local ordinances.

3.3.3. Sound Intrusions

Keep construction activities under surveillance and control to minimize environment damage by noise. Comply with the provisions of the state and Installation rules.

3.3.4. Burning

Burning is not allowed on the project site unless specified in other sections of the specifications or by written authorization. Specific times, locations, and manners of burning shall be subject to approval.

3.4. CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes shall be as directed below, unless otherwise specified in other sections and/or shown on the drawings.

3.4.1. Solid Wastes

Place solid wastes (excluding clearing debris) in containers which are emptied on a regular schedule. Conduct handling, storage, and disposal to prevent contamination. Employ segregation measures so that no hazardous or toxic waste will become co-mingled with solid waste. Transport solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal. The minimum acceptable off-site solid waste disposal option is a Subtitle D RCRA permitted landfill. Verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate. Comply with Federal, State, and local laws and regulations pertaining to the use of landfill areas.

3.4.2. Chemicals and Chemical Wastes

Dispense chemicals, ensuring no spillage to the ground or water. Perform and document periodic inspections of dispensing areas to identify leakage and initiate corrective action. The Government may periodically review this documentation. Collect chemical waste in corrosion resistant, compatible containers. Monitor and remove collection drums to a staging or storage area when contents are within 6 inches of the top. Classify, manage, store, and dispose of wastes in accordance with Federal, State, and local laws and regulations.

3.4.3. Contractor Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable state and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. At a minimum, manage and store hazardous waste in compliance with 40 CFR 262. Take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. Segregate hazardous waste from other materials and wastes; protect it from the weather by placing it in a safe covered location and take precautionary measures, such as berming or other appropriate measures, against accidental spillage. Store, describe, package, label, mark, and placard hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, state, and local laws and regulations. Transport Contractor generated hazardous waste off Government property in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. Dispose of hazardous waste in compliance with Federal, State and local laws and regulations. Immediately report spills of hazardous or toxic materials to the Government and the Facility Environmental Office. Contractor will be responsible for cleanup and cleanup costs due to spills. Contractor is responsible for the disposition of Contractor generated hazardous waste and excess hazardous materials.

3.4.4. Fuel and Lubricants

Conduct storage, fueling and lubrication of equipment and motor vehicles in a manner that affords the maximum protection against spill and evaporation. Manage and store fuel, lubricants and oil in accordance with all Federal, State, Regional, and local laws and regulations.

3.5. RECYCLING AND WASTE MINIMIZATION

Participate in State and local government sponsored recycling programs. The Contractor is further encouraged to minimize solid waste generation throughout the duration of the project. Line and berm fueling areas and establish storm water control structures at discharge points for site run-off. Keep a liquid containment clean-up kit available at the fueling area.

3.6. HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Existing historical, archaeological, and cultural resources within the Contractor's work area are shown on the drawings. Protect and preserve these resources during the life of the Contract. Temporarily suspend all activities that may damage or alter such resources, if any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found during excavation or other construction activities. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, notify the Government so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. Cease all activities that may result in impact to or the destruction of these resources. Secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources.

3.7. BIOLOGICAL RESOURCES

Minimize interference with, disturbance to, and damage to fish, wildlife, and plants, including their habitat. Protect threatened and endangered animal and plant species including their habitat in accordance with Federal, State, Regional, and local laws and regulations.

3.8. INTEGRATED PEST MANAGEMENT

Coordinate, through the Government, with the Installation Pest Management Coordinator (IPMC) at the earliest possible time prior to pesticide application, in order to minimize impacts to existing fauna and flora. Discuss

integrated pest management strategies with the IPMC and receive concurrence from the IPMC, through the COR, prior to the application of any pesticide associated with these specifications. Give IMPC personnel the opportunity to be present at all meetings concerning treatment measures for pest or disease control and during application of the pesticide. The use and management of pesticides are regulated under 40 CFR 152 - 186.

3.8.1. Pesticide Delivery and Storage

Deliver pesticides, approved for use on the Installation, to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses.

3.8.2. Qualifications

Use the services of a subcontractor for pesticide application whose principal business is pest control. The subcontractor shall be licensed and certified in the state where the work is to be performed.

3.8.3. Pesticide Handling Requirements

Formulate, treat with, and dispose of pesticides and associated containers in accordance with label directions.

3.8.4. Application

A state certified pesticide applicator shall apply pesticides in accordance with EPA label restrictions and recommendations.

3.9. PREVIOUSLY USED EQUIPMENT

Clean all previously used construction equipment prior to bringing it onto the project site. Ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the USDA jurisdictional office for additional cleaning requirements.

3.10. MILITARY MUNITIONS

Immediately stop work in that area and immediately inform the Government, in the event military munitions, as defined in 40 CFR 260, are discovered or uncovered.

3.11. TRAINING OF CONTRACTOR PERSONNEL

Train personnel in all phases of environmental protection and pollution control. Conduct environmental protection/pollution control meetings for all Contractor personnel prior to commencing construction activities. Conduct additional meetings for new personnel and when site conditions change. The training and meeting agenda shall include methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, wetlands, and endangered species and their habitat that are known to be in the area.

3.12. POST CONSTRUCTION CLEANUP

Clean up all areas used for construction in accordance with Contract Clause: "Cleaning Up". Unless otherwise instructed in writing, obliterate all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. Grade, fill and seed the entire disturbed area, unless otherwise indicated.

**SECTION 01 62 35
RECYCLED/RECOVERED MATERIAL**

1.0 GENERAL

1.1. REFERENCES

1.2. OBJECTIVES

1.3. EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

1.4. EPA PROPOSED ITEMS INCORPORATED IN THE WORK

1.5. EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

1.0 GENERAL

1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

- U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
- 40 CFR 247 Comprehensive Procurement Guideline for Products Containing Recovered Materials

1.2. OBJECTIVES

Government procurement policy is to acquire, in a cost effective manner, items containing the highest percentage of recycled and recovered materials practicable consistent with maintaining a satisfactory level of competition without adversely affecting performance requirements or exposing suppliers' employees to undue hazards from the recovered materials. The Environmental Protection Agency (EPA) has designated certain items which must contain a specified percent range of recovered or recycled materials. The Contractor shall make all reasonable efforts to use recycled and recovered materials in providing the EPA designated products and in otherwise utilizing recycled and recovered materials in the execution of the work.

1.3. EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

Materials that have been designated by EPA as being products which are or can be made with recovered or recycled materials, when incorporated into the work under this contract, shall contain at least the minimum percentage of recycled or recovered materials indicated by EPA unless adequate justification (non-availability) for non-use is provided. When a designated item is specified as an option to a non-designated item, the designated item requirements apply only if the designated item is used in the work.

1.4. EPA PROPOSED ITEMS INCORPORATED IN THE WORK

Products other than those designated by EPA are still being researched and are being considered for future Comprehensive Procurement Guideline (CPG) designation. It is recommended that these items, when incorporated in the work under this contract, contain the highest practicable percentage of recycled or recovered materials, provided specified requirements are also met.

1.5. EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

There are many products listed in 40 CFR 247 which have been designated or proposed by EPA to include recycled or recovered materials that may be use by the Contractor in performing the work but will not be incorporated into the work. These products include office products, temporary traffic control products, and pallets. It is recommended that these non-construction products, when used in the conduct of the work, contain the highest practicable percentage of recycled or recovered materials and that these products be recycled when no longer needed.

End of Section 01 62 35

**SECTION 01 78 02.00 10
CLOSEOUT SUBMITTALS**

1.0 OVERVIEW

- 1.1. SUBMITTALS
- 1.2. PROJECT RECORD DOCUMENTS
- 1.3. EQUIPMENT DATA
- 1.4. CONSTRUCTION WARRANTY MANAGEMENT
- 1.5. MECHANICAL TESTING, ADJUSTING, BALANCING, AND COMMISSIONING
- 1.6. OPERATION AND MAINTENANCE MANUALS
- 1.7. FIELD TRAINING
- 1.8. PRICING OF CONTRACTOR-FURNISHED AND INSTALLED PROPERTY AND GOVERNMENT-FURNISHED CONTRACTOR-INSTALLED PROPERTY
- 1.9. LEED REVIEW MEETINGS
- 1.10. RED ZONE MEETING
- 1.11. FINAL CLEANING
- 1.12. INTERIM FORM DD1354 "TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY"

EXHIBIT 1 SAMPLE RED ZONE MEETING CHECKLIST

1.0 OVERVIEW

1.1. SUBMITTALS

Government approval is required for any submittals with a "G" designation; submittals not having a "G" designation are for Designer of Record approval or for information only. Submit the following in accordance with Section 01 33 00 submittals:

SD-02 Shop Drawings

- As-Built Drawings - G
 - Drawings showing final as-built conditions of the project. Provide electronic drawing files as specified in Section 01 33 16, 3 sets of blue-line prints and one set of the approved working as-built drawings.

SD-03 Product Data

- As-Built Record of Equipment and Materials
 - Two copies of the record listing the as-built materials and equipment incorporated into the construction of the project.
- Construction Warranty Management Plan
 - Three sets of the construction warranty management plan containing information relevant to the warranty of materials and equipment incorporated into the construction project, including the starting date of warranty of construction. Furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.
- Warranty Tags
 - Two record copies of the warranty tags showing the layout and design.
- Final Cleaning
 - Two copies of the listing of completed final clean-up items.

1.2. PROJECT RECORD DOCUMENTS

1.2.1. As-Built Drawings – G

An as-built drawing is a construction drawing revised to reflect the final as-built conditions of the project as a result of modifications and corrections to the project design required during construction. The final as-built drawings shall not have the appearance of marked up drawings, but that of professionally prepared drawings as if they were the "as designed" drawings.

1.2.2. Maintenance of As-Built Drawings

1.2.2.1. The Configuration Management Plan shall describe how the Contractor will maintain up-to-date drawings, how it will control and designate revisions to the drawings and specifications (In accordance with Special Contract Requirement: ***Deviating from the Accepted Design*** and Section 01 33 16: ***Design after Award***, the Designer of Record's approval is necessary for any revisions to the accepted design).

1.2.2.2. Make timely updates, carefully maintaining a record set of working as-built drawings at the job site, marked in red, of all changes and corrections from the construction drawings. Enter changes and corrections on drawings promptly to reflect "Current Construction". Perform this update no less frequently than weekly for the blue line drawings and update no less frequently than quarterly for the CADD/CAD and BIM files, which were prepared previously in accordance with Section 01 33 16. Include a confirmation that the as-builts are up to date with the submission of the monthly project schedule.

1.2.2.3. If the DB Contractor fails to maintain the as-built drawings as required herein, the Government will retain from the monthly progress payment, an amount representing the estimated monthly cost of maintaining the as-built drawings. Final payment with respect to separately priced facilities or the contract as a whole will be withheld until the Contractor submits acceptable as-built drawings and the Government approves them.

1.2.2.4. The marked-up set of drawings shall reflect any changes, alterations, adjustments or modifications. Changes must be reflected on all sheets affected by the change. Changes shall include marking the drawings to reflect structural details, foundation layouts, equipment sizes, and other extensions of design.

1.2.2.5. Typically, room numbers shown on the drawings are selected for design convenience and do not represent the actual numbers intended for use by the end user. Final as-built drawings shall reflect actual room numbers adopted by the end user.

1.2.2.6. If there is no separate contract line item (CLIN) for as-built drawings, the Government will withhold the amount of \$35,000, or 1% of the present construction value, whichever is the greater, until the final as-built drawing submittal has been approved by the Government.

1.2.3. Underground Utilities

The drawings shall indicate, in addition to all changes and corrections, the actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, the as-built drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction. Locate Valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Record average elevation of the top of each run or underground structure..

1.2.4. Partial Occupancy

For projects where portions of construction are to be occupied or activated before overall project completion, including portions of utility systems, supply as-built drawings for those portions of the facility being occupied or activated at the time the facility is occupied or activated. Show this same as-built information previously furnished on the final set of as-built drawings.

1.2.5. As-Built Conditions That are Different From the construction Drawings

Accurately reflect all as-built conditions that are different, such as dimensions, road alignments and grades, and drainage and elevations, from the construction drawings on each drawing. If the as-built condition is accurately reflected on a shop drawing, then furnish that shop drawing in CADD format. Reference the final as-built construction drawing the shop drawing file that includes the as-built information. In turn, the shop drawing shall reference the applicable construction as-built drawing. Delete any options shown on drawings and not selected clearly reflect options selected on final as-built drawings.

1.2.6. Additional As-Built Information that Exceeds the Detail Shown on the construction Drawings:

These as-built conditions include those that reflect structural details, foundation layouts, equipment, sizes, mechanical and electrical room layouts and other extensions of design, that were not shown in the project design documents because the exact details were not known until after the time of approved shop drawings. It is recognized that these shop drawing submittals (revised showing as-built conditions) will serve as the as-built record without actual incorporation into the construction drawings, piping, and equipment drawings. Include locations of all explorations, logs of all explorations, and results of all laboratory testing, including those provided by the Government. Furnish all such shop drawings in CADD /CADformat. Include fire protection details, such as wiring, performed for the design of the project.

1.2.7. Final As-Built Drawings

Submit final as-built CADD/CAD and BIM Model(s) and Facility Data files at the time of Beneficial Occupancy of the project or at a designated phase of the project. In the event the Contractor accomplishes additional work after this submittal, which changes the as-built conditions, submit a new DVD with all drawing sheets and three blue-line copies of affected sheets which depict additional changes.

1.2.8. Title Blocks

In accordance with the configuration management plan, clearly mark title blocks to indicate final as-built drawings.

1.2.9. Other As-Built Documents

Provide scans of all other documents such as design analysis, catalog cuts, certification documents that are not available in native electronic format in an organized manner in Adobe.pdf format.

1.2.9.1. LEED Documentation

Update LEED documentation on at least a monthly basis and have it available for review by the Government on the jobsite at all times during construction. Submit the final LEED Project Checklist(s), final LEED submittals checklist and complete project documentation, verifying the final LEED score and establishing the final rating. Provide full support to the validation review process, including credit audits. See also the LEED documentation requirements in Section 01 33 16, DESIGN AFTER AWARD.

1.2.9.2. GIS Documentation

Provide final geo-referenced GIS database of the new building footprint along with any changes made to exterior of the building. The intent of capturing the final building footprint and exterior modifications in a GIS database is to provide the installation with a data set of the comprehensive changes made to the landscape as a result of the construction project. The Government will incorporate this data set into the installations existing GIS MasterPlan or Enterprise GIS system. The GIS database deliverable shall follow a standard template provided to the Contractor by the Government, adhere to detailed specifications outlined in ECB No 2006-15, and be documented using the Federal Geographic Data Committee (FGDC) metadata standard.

1.3. EQUIPMENT DATA

1.3.1. Real Property Equipment

Provide an Equipment-in-Place list of all installed equipment furnished under this contract. Include all information usually listed on manufacturer's name plate. Include the cost of each piece of installed property F.O.B. construction site. For each of the items which is specified herein to be guaranteed for a specified period from the date of acceptance thereof, provide the following information: The name, serial and model number address of equipment supplier, or manufacturer originating the guaranteed item. The Contractor's guarantee to the Government of these items will not be limited by the terms of any manufacturer's guarantee to the Contractor. Furnish the list as one (1) reproducible and three (3) copies thirty (30) calendar days before completion of any segment of the contract work which has an incremental completion date.

1.3.2. Maintenance and Parts Data

Furnish a brochure, catalog cut, parts list, manufacturer's data sheet or other publication showing detailed parts data on all other equipment subject to repair and maintenance procedures not otherwise required in Operations and Maintenance Manuals specified elsewhere in this contract. Distribution of directives shall follow the same requirements as listed in paragraph above.

1.3.3. Construction Specifications

Furnish permanent electronic files of final as-built construction specifications, including modifications thereto, with the as-built drawings.

1.4. CONSTRUCTION WARRANTY MANAGEMENT

1.4.1. Prior to the end of the one year warranty, the Government may conduct an infrared roof survey on any project involving a membrane roofing system. This survey will be conducted in accordance with ASTM C1153-90, "Standard Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging". The Contractor shall replace all damaged materials and locate and repair sources of moisture penetration.

1.4.2. Management

1.4.2.1. Warranty Management Plan

Develop a warranty management plan containing information relevant to the clause **Warranty of Construction** in FAR 52.246-21. Submit the warranty management plan for Government approval at least 30 days before the planned pre-warranty conference. In the event of phased turn-over of the contract, update the Warranty Management Plan as necessary to include latest information required. Include all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan shall be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below shall include due date and whether item has been submitted or was accomplished. Submit warranty information made available during the construction phase prior to each monthly pay estimate. Assemble information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period shall begin on the date of project acceptance and shall continue for the full product warranty period. The Contractor, Government, including the Customer Representative shall jointly conduct warranty inspections, 4 months and 9 months, after acceptance. The warranty management plan shall include, but shall not be limited to, the following information:

- (1) Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of the contractors, subcontractors, manufacturers or suppliers involved.
- (2) Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and for all commissioned systems such as fire protection and alarm systems, sprinkler systems, lightning protection systems, etc.
- (3) A list for each warranted equipment, item, feature of construction or system indicating:
 - (i) Name of item.
 - (ii) Model and serial numbers.
 - (iii) Location where installed.
 - (iv) Name and phone numbers of manufacturers or suppliers.
 - (v) Names, addresses and telephone numbers of sources of spare parts.
 - (vi) Warranties and terms of warranty. Include one-year overall warranty of construction. Indicate those items, which have extended warranties with separate warranty expiration dates.
 - (vii) Cross-reference to warranty certificates as applicable.
 - (viii) Starting point and duration of warranty period.
 - (ix) Summary of maintenance procedures required to continue the warranty in force.
 - (x) Cross-reference to specific pertinent Operation and Maintenance manuals.
 - (xi) Organization, names and phone numbers of persons to call for warranty service.
 - (xii) Typical response time and repair time expected for various warranted equipment.
- (4) The Contractor's plans for attendance at the 4 and 9 month post-construction warranty inspections conducted by the Government.
- (5) Procedure and status of tagging of all equipment covered by extended warranties.
- (6) Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

1.4.3. Performance Bond

1.4.3.1. The Contractor's Performance Bond will remain effective throughout the construction warranty period.

1.4.3.2. In the event the Contractor or his designated representative(s) fails to commence and diligently pursue any work required under this clause, and in a manner pursuant to the requirements thereof, the Government shall have

a right to demand that said work be performed under the Performance Bond by making written notice on the surety. If the surety fails or refuses to perform the obligation it assumed under the Performance Bond, the Government shall have the work performed by others, and after completion of the work, may make demand for reimbursement of any or all expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.

1.4.3.3. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the Contractor's expense, the Government will have the right to recoup expenses from the bonding company.

1.4.3.4. Following oral or written notification of required warranty repair work, the Contractor will respond as dictated by para. 1.4.5. Written verification will follow oral instructions. Failure of the Contractor to respond will be cause for the Government to proceed against the Contractor as outlined in the paragraph 1.4.5.5 and/or above.

1.4.4. Pre-Warranty Conference

Prior to contract completion, or completion of any phase or portion of contract to be turned over, and at a time designated by the Contracting Officer, the Contractor shall meet with the Government to develop a mutual understanding with respect to the requirements of this clause. Communication procedures for Contractor notification of warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Government for the execution of the construction warranty shall be established/reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, the Contractor will furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue warranty work action on behalf of the Contractor. This point of contact will be located within the local service area of the warranted construction, will be continuously available, and will be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of his responsibilities in connection with other portions of this provision.

1.4.5. Contractor's Response to Warranty Service Requirements.

Following Government oral or written notification, which may include authorized installation maintenance personnel, the Contractor shall respond to warranty service requirements in accordance with the "Warranty Service Priority List" and the three categories of priorities listed below. Submit a report on any warranty item that has been repaired during the warranty period. The report shall include the cause of the problem, date reported, corrective action taken, and when the repair was completed. If the Contractor does not perform the construction warranty within the timeframe specified, the Government will perform the work and backcharge the construction warranty payment item established.

1.4.5.1. First Priority Code 1 Perform onsite inspection to evaluate situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.

1.4.5.2. Second Priority Code 2 Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.

1.4.5.3. Third Priority Code 3 All other work to be initiated within 3 work days and work continuously to completion or relief.

1.4.5.4. The "Warranty Service Priority List" is as follows:

- Code 1 - Air Conditioning System
 - (a) Buildings with computer equipment.
 - (b) Barracks, mess halls (entire building down).
- Code 2 - Air Conditioning Systems
 - (a) Recreational support.
 - (b) Air conditioning leak in part of building, if causing damage.
 - (c) Air conditioning system not cooling properly

- (d) Admin buildings with Automated Data Processing (ADP) equipment not on priority list.
 - Code 1 - Doors
- (a) Overhead doors not operational.
 - Code 1 - Electrical
- (a) Power failure (entire area or any building operational after 1600 hours).
- (b) Traffic control devices.
- (c) Security lights.
- (d) Smoke detectors and fire alarm systems
- (e) Power or lighting failure to an area, facility, portion of a facility, which may adversely impact health, safety, security, or the installation's mission requirement, or which may result in damage to property.
 - Code 2 - Electrical
- (a) Power failure (no power) for unoccupied buildings or portions thereof or branch circuits within occupied buildings, not listed as Code 1.
- (a) Receptacle and lights, not listed as code 1.
 - Code 3 - Electrical
- (a) Street, parking area lights
 - Code 1 - Gas
- (a) Leaks and breaks.
- (b) No gas to cantonment area.
 - Code 1 - Heat
- (a) Area power failure affecting heat.
- (b) Heater in unit not working.
 - Code 2 Heat
- (a) All heating system failures not listed as Code 1.
 - Code 3 - Interior
- (a) Floor damage
- (b) Paint chipping or peeling
 - Code 1 - Intrusion Detection Systems - N/A.
 - Code 2 - Intrusion Detection Systems other than those listed under Code 1
 - Code 1 - Kitchen Equipment
- (a) Dishwasher.
- (b) All other equipment hampering preparation of a meal.
 - Code 2 - Kitchen Equipment
- (a) All other equipment not listed under Code 1.
 - Code 2 - Plumbing
- (a) Flush valves not operating properly
- (b) Fixture drain, supply line commode, or water pipe leaking.
- (c) Commode leaking at base.
 - Code 3 - Plumbing
- (a) Leaking faucets

- Code 1 - Refrigeration
 - (a) Mess Hall.
 - (b) Medical storage.
- Code 2 - Refrigeration
 - (a) Mess hall - other than walk-in refrigerators and freezers.
- Code 1 - Roof Leaks
 - (a) Temporary repairs will be made where major damage to property is occurring.
- Code 2 - Roof Leaks
 - (a) Where major damage to property is not occurring, check for location of leak during rain and complete repairs on a Code 2 basis.
- Code 1 - Sprinkler System
 - (a) All sprinkler systems, valves, manholes, deluge systems, and air systems to sprinklers.
- Code 1 - Tank Wash Racks (Bird Baths)
 - (a) All systems which prevent tank wash.
- Code 1 - Water (Exterior)
 - (a) Normal operation of water pump station.
- Code 2 - Water (Exterior)
 - (a) No water to facility.
- Code 1 - Water, Hot (and Steam)
 - (a) Barracks (entire building).
- Code 2 - Water, Hot
 - (a) No hot water in portion of building listed under Code 1

1.4.5.5. Should parts be required to complete the work and the parts are not immediately available, the Contractor shall have a maximum of 12 hours after arrival at the job site to provide the Government, with firm written proposals for emergency alternatives and temporary repairs for Government participation with the Contractor to provide emergency relief until the required parts are available on site for the Contractor to perform permanent warranty repair. The Contractor's proposals shall include a firm date and time that the required parts shall be available on site to complete the permanent warranty repair. The Government will evaluate the proposed alternatives and negotiate the alternative considered to be in the best interest of the Government to reduce the impact of the emergency condition. Alternatives considered by the Government will include the alternative for the Contractor to "Do Nothing" while waiting until the required parts are available to perform permanent warranty repair. Negotiating a proposal which will require Government participation and the expenditure of Government funds shall constitute a separate procurement action by the using service.

1.4.6. Equipment Warranty Identification Tags

1.4.6.1. Provide warranty identification tags at the time of installation and prior to substantial completion shall provide warranty identification tags on all Contractor and Government furnished equipment which the Contractor has installed.

- (a) The tags shall be suitable for interior and exterior locations, resistant to solvents, abrasion, and to fading caused by sunlight, precipitation, etc. These tags shall have a permanent pressure-sensitive adhesive back, and they shall be installed in a position that is easily (or most easily) noticeable. Tag each component of contractor furnished equipment that has differing warranties on its components.
- (b) Submit sample tags, representing how the other tags will look, for Government review and approval.
- (c) Tags for Warranted Equipment: The tag for this equipment shall be similar to the following: Exact format and size will be as approved.

MFG WARRANTY(IES) EXPIRE

MFG WARRANTY(IES) EXPIRE

(d) If the manufacturer's name (MFG), model number and serial number are on the manufacturer's equipment data plate and this data plate is easily found and fully legible, this information need not be duplicated on the equipment warranty tag

1.4.6.2. Execution: Complete the required information on each tag and install these tags on the equipment by the time of and as a condition of final acceptance of the equipment.

1.5. MECHANICAL TESTING, ADJUSTING, BALANCING, AND COMMISSIONING

Submit; all reports, statements, certificates, and completed checklists for testing, adjusting, balancing, and commissioning of mechanical systems prior to final inspection and transfer of the completed facility for approval, as specified in applicable technical specification sections.

1.6. OPERATION AND MAINTENANCE MANUALS

1.6.1. General Requirements

1.6.1.1. Inasmuch as the operations and maintenance manuals are required to operate and maintain the facility, the operations and maintenance (O&M) manuals will be considered a requirement prior to substantial completion of any facility to be turned over to the Government. Beneficial occupancy of all or portions of a facility prior to substantial completion will not relieve the Contractor of liquidated damages, if substantial completion exceeds the required completion date.

1.6.1.2. Provide one permanent electronic copy on CD-ROM and 2 hard copies of the Equipment Operating, Maintenance, and Repair Manuals. Provide separate manuals for each utility system as defined hereinafter. Submit Operations and Maintenance manuals for approval before field training or 90 days before substantial completion (whichever occurs earlier). If there is no separate CLIN for O&M Manuals, the Government will withhold an amount representing \$20,000, as non-progressed work, until submittal and approval of all O&M manuals are complete.

1.6.2. Definitions

1.6.2.1. Equipment

A single piece of equipment operating alone or in conjunction with other equipment to accomplish a system function.

1.6.2.2. System

A combination of one or more pieces of equipment which function together to accomplish an intended purpose (i.e. HVAC system is composed of many individual pieces of equipment such as fans, motors, compressors, valves, sensors, relays, etc.)

1.6.3. Hard Cover Binders

The manuals shall be hard cover with posts, or 3-ring binders, so sheets may be easily substituted. Print the following identification on the cover: the words "EQUIPMENT OPERATING, MAINTENANCE, AND REPAIR MANUALS," the project name, building number, and an indication of utility or systems covered, the name of the Contractor, and the Contract number. Manuals shall be approximately 8-1/2 by 11-inches with large sheets folded in and capable of being easily pulled out for reference. All manuals for the project must be similar in appearance, and be of professional quality.

1.6.4. Warning Page

Provide a warning page to warn of potential dangers (if they exist, such as high voltage, toxic chemicals, flammable liquids, explosive materials, carcinogens, high pressures, etc.). Place the warning page inside the front cover and in front of the title page. Include any necessary Material Safety Data Sheets (MSDS) here.

1.6.5. Title Page

The title page shall include the same information shown on the cover and show the name of the preparing firm and the date of publication.

1.6.6. Table of Contents

Each volume of the set of manuals for this project shall include a table of contents, for the entire set, broken down by volume.

1.6.7. GENERAL

Organize manuals according to the following format, and include information for each item of equipment. Submit a draft outline and table of contents for approval at 50% contract completion.

TABLE OF CONTENTS

PART I: Introduction

- Equipment Description
- Functional Description
- Installation Description

PART II: Operating Principles

PART III: Safety

PART IV: Preventive Maintenance

- Preventive Maintenance Checklist, Lubrication
- Charts and Diagrams

PART V: Spare Parts Lists

- Troubleshooting Guide
- Adjustments
- Common Repairs and Parts Replacement

PART VI: Illustrations

1.6.7.1. Part I-Introduction

Part I shall provide an introduction, equipment or system description, functional description and theory of operation, and installation instructions for each piece of equipment. Include complete instructions for uncrating, assembly, connection to the power source and pre-operating lubrication in the installation instructions as applicable. Illustrations, including wiring and cabling diagrams, are required as appropriate in this section. Include halftone pictures of the equipment in the introduction and equipment description, as well as system layout drawings with each item of equipment located and marked. Do not use copies of previously submitted shop drawings in these manuals.

1.6.7.2. Part II-Operating Principles

Part II shall provide complete instructions for operating the system, and each piece of equipment. Illustrations, halftone pictures, tables, charts, procedures, and diagrams are required when applicable. This will include step-by-step procedures for start-up and shutdown of both the system and each component piece of equipments, as well as adjustments required to obtain optimum equipment performance, and corrective actions for malfunctions. Show performance sheets and graphs showing capacity data, efficiencies, electrical characteristics, pressure drops, and flow rates here, also. Marked-up catalogs or catalog pages do not satisfy this requirement. Present performance information as concisely as possible with only data pertaining to equipment actually installed. Include actual test data collected for Contractor performance here.

1.6.7.3. Part III-Safety

Part III shall contain the general and specific safety requirements peculiar to each item of equipment. Repeat safety information as notes cautions and warnings in other sections where appropriate to operations described.

1.6.7.4. Part IV-Preventive Maintenance

Part IV shall contain a troubleshooting guide, including detailed instructions for all common adjustments and alignment procedures, including a detailed maintenance schedule. Also include a diagnostic chart showing symptoms and solutions to problems. Include test hookups to determine the cause, special tools and test equipment, and methods for returning the equipment to operating conditions. Information may be in chart form or in tabular format with appropriate headings. Include instructions for the removal, disassembly, repair, reassembly, and replacement of parts and assemblies where applicable and the task is not obvious.

1.6.7.5. Part V-Spare Parts List

Part V shall contain a tabulation of description data and parts location illustrations for all mechanical and electrical parts. The heading of the parts list shall clearly identify the supplier, purchase order number, and equipment. Include the unit price for each part. List parts by major assemblies, and arrange the listing in columnar form. Include names and addresses of the nearest manufacturer's representatives, as well as any special warranty information. Provide a list of spare parts that are recommended to be kept in stock by the Government installation.

1.6.7.6. Part VI-Illustrations

Part VI shall contain assembly drawings for the complete equipment or system and for all major components. Include complete wiring diagrams and schematics. Other illustrations, such as exploded views, block diagrams, and cutaway drawings, are required as appropriate.

1.6.8. Framed Instructions

Post framed instructions are required for substantial completion. Post framed instructions under glass or in laminated plastic, including wiring and control diagrams showing the complete layout of the entire system, including equipment, ductwork, piping valves, dampers, and control sequence at a location near the equipment described. Prepare condensed operating instructions explaining preventive maintenance procedures methods of checking the system for normal safe operation, valve schedule and procedures for safely starting and stopping the system in type form, framed as specified above for the wiring and control diagrams and posted beside the diagrams. Submit proposed diagrams, instructions, and other sheets prior to posting. Post the framed instructions before field training.

1.6.9. (Reserved. See 1.7 for Field Training)

1.6.10. System/Equipment Requirements

1.6.10.1. Facility Heating System

Provide information on the following equipment: boilers, water treatment, chemical feed pumps and tanks, converters, heat exchangers, pumps, unit heaters, fin-tube radiation, air handling units (both heating only and heating and cooling), and valves (associated with heating systems).

1.6.10.2. Air-Conditioning Systems

Provide information in chillers, packaged air-conditioning equipment, towers, water treatment, chemical feed pumps and tanks, air-cooled condensers, pumps, compressors, air handling units, and valves (associated with air-conditioning systems).

1.6.10.3. Temperature Control and HVAC Distribution Systems

Provide all information described for the following equipment: valves, fans, air handling units, pumps, boilers, converters and heat exchangers, chillers, water cooled condensers, cooling towers, and fin-tube radiation, control air compressors, control components (sensors, controllers, adapters and actuators), and flow measuring equipment.

1.6.10.4. Central Heating Plants

Provide the information described for the following equipment: boilers, converters, heat exchangers, pumps, fans, steam traps, pollution control equipment, chemical feed equipment, control systems, fuel handling equipment, de-aerators, tanks (flash, expansion, return waters, etc.), water softeners, and valves.

1.6.10.5. Heating Distribution Systems

Provide the information described for the following equipment: valves, fans, pumps, converters and heat exchangers, steam traps, tanks (expansion, flash, etc.), and piping systems.

1.6.10.6. Exterior Electrical Systems

Provide information on the following equipment: power transformers, relays, reclosers, breakers, and capacitor bank controls.

1.6.10.7. Interior Electrical Systems

Provide information on the following equipment: relays, motor control centers, switchgear, solid state circuit breakers, motor controller, EPS lighting systems, wiring diagrams and troubleshooting flow chart on control systems, and special grounding systems.

1.6.10.8. Energy Monitoring and Control Systems

The maintenance manual shall include descriptions of maintenance for all equipment, including inspection, periodic preventative maintenance, fault diagnosis, and repair or replacement of defective components.

1.6.10.9. Domestic Water Systems

Provide the identified information on the following equipment: tanks, unit process equipment, pumps, motors, control and monitoring instrumentation, laboratory test equipment, chemical feeders, valves, switching gear, and automatic controls.

1.6.10.10. Wastewater Treatment Systems

Provide the identified information on the following equipment: tanks, unit process equipment, pumps, motors, control and monitoring instrumentations, laboratory test equipment chemical feeders, valves, scrapers, skimmers, comminutors, blowers, switching gear, and automatic controls.

1.6.10.11. Fire Protection Systems

Provide information on the following equipment: alarm valves, manual valves, regulators, foam and gas storage tanks, piping materials, sprinkler heads, nozzles, pumps, and pump drivers.

1.6.10.12. Fire Alarm and Detection Systems

- (1) The maintenance manual shall include description of maintenance for all equipment, including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.
- (2) Provide all software; database with complete identification of programmable portions of system equipment and devices, and all other system programming data on all modes of the system; connecting cables; and proprietary equipment necessary for the operation, maintenance, testing, repair and programming, etc. of the system and that may be required for implementation of future changes to the fire system (additional and/or relocated initiating devices, notification devices, etc.
- (3) Provide all system and equipment technical data and computer software with the requisite rights to Government use, in accordance with the applicable contract clauses.
- (4) Training shall include software and programming required for the effective operation, maintenance, testing, diagnostics and expansion of the system.

1.6.10.13. Plumbing Systems

Provide information on the following equipment: water heaters, valves, pressure regulators backflow preventors, piping materials, and plumbing fixtures.

1.6.10.14. Liquid Fuels Systems

Provide information on the following equipment: tanks, automatic valves manual valves, filter separators, pumps, mechanical loading arms, nozzles, meters, electronic controls, electrical switch gear, and fluidic controls.

1.6.10.15. Cathodic Protection Systems

Provide information on the following material and equipment: rectifiers, meters, anodes, anode backfill, anode lead wire, insulation material and wire size, automatic controls (if any), rheostats, switches, fuses and circuit breakers, type and size of rectifying elements, type of oil in oil-immersed rectifiers, and rating of shunts.

1.6.10.16. Generator Installations

Provide information on the following equipment: generator sets, automatic transfer panels, governors, exciters, regulators starting systems, switchgear, and protective devices.

1.6.10.17. Miscellaneous Systems

Provide information on the following: communication and ADP systems, security and intrusion alarm, elevators, material handling, active solar, photovoltaic, nurse call, paging, intercom, closed circuit TV, irrigation, sound and material delivery systems, kitchen, refrigeration, disposal, ice making equipment, and other similar type special systems not otherwise specified.

1.6.10.18. Laboratory, Environmental and Pollution Control Systems

Provide information on the following equipment: wet scrubbers, quench chambers, scrub tanks, liquid oil separators, and fume hoods.

1.7. FIELD TRAINING

Field Training is a requirement for substantial completion. Conduct a training course for the operating staff for each particular system. Conduct the training is to be conducted during hours of normal working time after the system is functionally complete. The field instructions shall cover all of the items contained in the Equipment Operating, Maintenance and Repair Manuals. The training will include both classroom and "hands-on" training. Submit a lesson plan outlining the information to be discussed during training periods. Submit this lesson plan for approval 90 days before contract completion before the field training occurs. Record training on DVD and furnish to the Government within ten (10) days following training. Document all training and furnish a list of all attendees.

1.8. PRICING OF CONTRACTOR-FURNISHED AND INSTALLED PROPERTY AND GOVERNMENT-FURNISHED CONTRACTOR-INSTALLED PROPERTY

Promptly furnish and require any sub-contractor or supplier to furnish, in like manner, unit prices and descriptive data required by the Government for Property Record purposes of fixtures and equipment furnished and/or installed by the Contractor or sub-contractor, except prices do not need to be provided for Government-Furnished Property.

1.9. LEED REVIEW MEETINGS

1.9.1. Pre-Closeout Meeting. Approximately 30 days before submittal of LEED closeout documentation, the Contractor and the Government's project delivery team (including Installation representative) will meet to review the documentation, determine which, if any, credits will be audited and identify any corrections/missing items prior to the closeout LEED documentation submittal.

1.9.2. Approximately 14 days after submittal of LEED closeout documentation, the Contractor and the Government's project delivery team (including Installation representative) will meet to review the LEED closeout

documentation. The review conference will include discussion of and resolution of all review comments to ensure consensus on achievement of credits and satisfactory documentation. At the review conference a final score will be determined and endorsed in writing by all parties.

1.10. RED ZONE MEETING

At approximately 80% of contract completion or 60 days before the anticipated Beneficial Occupancy Date (BOD), whichever occurs first, the Contractor and the Government's project delivery team will conduct what is known as the Red Zone Meeting to discuss the close-out process, to schedule the events and review responsibilities for actions necessary to produce a timely physical, as well as fiscal, project close-out. The Red Zone meeting derives its name from the football term used to describe the team effort to move the ball the last 20 yards into the end zone. The close-out of a construction project sometimes can be equally as hard and most definitely requires the whole team's efforts. The ACO will chair the meeting. If not already provided, shortly before the meeting, the Contractor shall provide an electronic copy or access to the CADD as-built drawings, completed commensurate with the amount of work completed at the time of the Red Zone Meeting, as an indicator of the Contractors' understanding of and ability to meet the USACE CADD Standards and to ensure that the Contractor is making progress with CADD As-Built requirements. EXHIBIT 1 is a generic meeting checklist.

1.11. FINAL CLEANING

Clean the premises in accordance with FAR clause 52.236-12 and additional requirements stated here. Remove stains, foreign substances, and temporary labels from surfaces. Vacuum carpet and soft surfaces. Clean equipment and fixtures to a sanitary condition. Clean or replace filters of operating equipment if cleaning isn't possible or practicable. Remove debris from roofs, drainage systems, gutters, and downspouts. Sweep paved areas and rake clean landscaped areas. Remove waste, surplus materials, and rubbish from the site. Remove all temporary structures, barricades, project signs, fences and construction facilities. Submit a list of completed clean-up items on the day of final inspection.

1.12. INTERIM FORM DD1354 "TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY

Near the completion of Project, but a minimum of 60 days prior to final acceptance of the work, complete, update draft provided with the final design package(s) (see Section 01 33 16, paragraph 3.7.5) and submit an accounting of all installed property on Interim Form DD1354 "Transfer and Acceptance of Military Real Property." Include any additional assets/improvements/alterations and cost updates from the Draft DD Form 1354. Contact the COR for any project specific information necessary to complete the DD Form 1354. This form will be a topic for the Red Zone Meeting discussed above. For information purposes, a blank DD Form 1354 (fill-able) in ADOBE (PDF) may be obtained at the following web site: <http://www.dtic.mil/whs/directives/infomgt/forms/eforms/dd1354.pdf> Submit the completed Checklist for Form DD1354 of Government-Furnished and Contractor-Furnished/Contractor Installed items. Attach this list to the updated DD Form 1354. Instructions for completing the form and a blank checklist (fill-able) in ADOBE (PDF) may be obtained at the following web site: http://www.wbdg.org/ccb/DOD/UFC/ufc_1_300_08.pdf

EXHIBIT 1

SAMPLE

Red Zone Meeting Checklist

Date: _____

Contract No.	
Description / Location	
Contractor	
Contracting Officer	

Action	Completion Milestone	√
Inspections		
Fire		
Safety		
Pre-final		
Mechanical Test & Balance		
Commissioning		
Landscaping Complete		
Erosion Control		
Beneficial Occupancy Date (BOD)		
Furniture Installation		
Comm Installation		
As-Built Drawings		
Provide all O&M manuals, tools, shop drawings, spare parts, etc. to customer		
Training of O&M Personnel		
Provide Warranty documents to Customer		
Contract completion		

Ribbon cutting		
Payroll Clearances		
DD Form 2626 - Construction Contractor Performance Evaluation		
DD Form 2631 – A-E Performance Rated after Construction		
Status of Pending Mods and REA's/Claims		
Final Payment Completed		
Release of Claims		
Return of Unobligated Funds		
Move Project from CIP to General Ledger		
Financial completion		

End of Section 01 78 02.00 10

SECTION 01 10 00.0001
TASK ORDER STATEMENT OF WORK

1.0 PROJECT OBJECTIVES

1.1. SECTION ORGANIZATION

2.0 SCOPE

2.1. Indoor Aquatics Training Center

2.2. SITE

2.3. GOVERNMENT-FURNISHED GOVERNMENT INSTALL EQUIPMENT (GFGI)

2.4. FURNITURE REQUIREMENTS

3.0 Indoor Aquatics Training Center

3.1. GENERAL REQUIREMENTS

3.2. FUNCTIONAL AND AREA REQUIREMENTS

4.0 APPLICABLE CRITERIA

4.1. INDUSTRY CRITERIA

4.2. MILITARY CRITERIA

5.0 GENERAL TECHNICAL REQUIREMENTS

5.1. SITE PLANNING AND DESIGN

5.2. SITE ENGINEERING

5.3. ARCHITECTURE AND INTERIOR DESIGN

5.4. STRUCTURAL DESIGN

5.5. THERMAL PERFORMANCE

5.6. PLUMBING

5.7. ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

5.8. HEATING, VENTILATING AND AIR CONDITIONING

5.9. ENERGY CONSERVATION

5.10. FIRE PROTECTION

5.11. SUSTAINABLE DESIGN

5.12. CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT

5.13. SECURITY (ANTI-TERRORISM STANDARDS)

6.0 PROJECT SPECIFIC REQUIREMENTS

- 6.1. GENERAL
- 6.2. APPROVED DEVIATIONS
- 6.3. SITE PLANNING AND DESIGN
- 6.4. SITE ENGINEERING
- 6.5. ARCHITECTURE
- 6.6. STRUCTURAL DESIGN
- 6.7. THERMAL PERFORMANCE
- 6.8. PLUMBING
- 6.9. SITE ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS
- 6.10. FACILITY ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS
- 6.11. HEATING, VENTILATING AND AIR CONDITIONING
- 6.12. ENERGY CONSERVATION
- 6.13. FIRE PROTECTION
- 6.14. SUSTAINABLE DESIGN
- 6.15. ENVIRONMENTAL
- 6.16. PERMITS
- 6.17. DEMOLITION
- 6.18. ADDITIONAL FACILITIES

1.0 PROJECT OBJECTIVES

The project objective is to design and construct facilities for the military that are consistent with the design and construction practices used for civilian sector projects that perform similar functions to the military projects. For example, a Company Operations Facility has the similar function as an office/warehouse in the civilian sector; therefore the design and construction practices for a company operations facility should be consistent with the design and construction of an office/warehouse building.

Comparison of Military Facilities to Civilian Facilities

Military Facility	Civilian Facility
Indoor Aquatics Training Center	Natatorium

It is the Army's objective that these buildings will have a 25-year useful design life before a possible re-use/re-purpose or renovation requirement, to include normal sustainment, restoration, modernization activities and a 50-year building replacement life. Therefore, the design and construction should provide an appropriate level of quality to ensure the continued use of the facility over that time period with the application of reasonable preventive maintenance and repairs that would be industry-acceptable to a major civilian sector project OWNER. The site infrastructure will have at least a 50-year life expectancy with industry-accepted maintenance and repair cycles.

The project site should be developed for efficiency and to convey a sense of unity or connectivity with the adjacent buildings and with the Installation as a whole.

Requirements stated in this contract are minimums. Innovative, creative, and life cycle cost effective solutions, which meet or exceed these requirements are encouraged. Further, the OFFEROR is encouraged to seek solutions that will expedite construction (panelization, pre-engineered, etc.) and shorten the schedule. **The intent of the Government is to emphasize the placement of funds into functional/operational requirements. Materials and methods should reflect this by choosing the lowest Type of Construction allowed by code for this occupancy/project allowing the funding to be reflected in the quality of interior/exterior finishes and systems selected.**

1.1. SECTION ORGANIZATION

This Section is organized under 6 major "paragraphs".

- (1) Paragraph 1 is intended to define the project objectives and to provide a comparison between the military facility(ies) and comparable "civilian" type buildings.
- (2) Paragraph 2 describes the scope of the project.
- (3) Paragraph 3 provides the functional, operational and facility specific design criteria for the specific facility type(s) included in this contract or task order.
- (4) Paragraph 4 lists applicable industry and government design criteria, generally applicable to all facility types, unless otherwise indicated in the Section. It is not intended to be all-inclusive. Other industry and government standards may also be used, where necessary to produce professional designs, unless they conflict with those listed.
- (5) Paragraph 5 contains Army Standard Design Criteria, generally applicable to all facility types, unless otherwise indicated in the Section.
- (6) Paragraph 6 contains installation and project specific criteria supplementing the other 5 paragraphs.

2.1. INDOOR AQUATICS FACILITY

Provide an Indoor Aquatics Facility with a maximum authorized gross building square footage of 64,010 square feet. Paragraphs 2.1.1. through 2.1.3. describe the base bid of minimum 51,000 square feet. Paragraph 2.1.4. describes options to increase the square footage of the facility. Option 3 increases the base bid by 8500 square feet for a minimum facility size of 59,500 square feet. Option 4 increases the base bid by 13,010 square feet for a maximum facility size of 64,010 square feet. The overall goal is to provide a functional, secure, visually appealing facility that is a source of pride for the installation. The desire is to provide a "State-of-the-Art" facility that rival fitness center and health club facilities found in local communities and on college campuses. The design and finishes shall be appropriate for a training facility, but also shall be appropriate for a recreational facility that would be found in communities and college campuses. Structures and finishes must be capable of resisting corrosion from moisture and chemical vapor. Natatorium structures pose opportunities for interesting geometry, lighting, and material use. Both interior and exterior walls should be masonry construction with brick, composite material siding, metal panels, stucco, or similar materials that are architecturally compatible with the installation specific guidelines. All surfaces shall be moisture and mildew resistant and easily cleanable. Dressing rooms, shower rooms, drying areas, and toilets shall be considered wet areas. All walls and floors in wet areas shall be impervious to water and able to be hosed down for cleaning. Wet area floors shall be non-slip, pitched to floor drains, and shall have coved bases at walls and equipment bases. Consider providing elevated concrete pads for lockers and other equipment to facilitate cleaning and help eliminate the corrosive effects of frequent exposure to water.

Bidders are responsible for the construction of all site work shown in the Site Package for the base bid and all awarded bid options, as defined in Appendices J, PP, and corresponding separate site design files provided by the Contracting Officer.

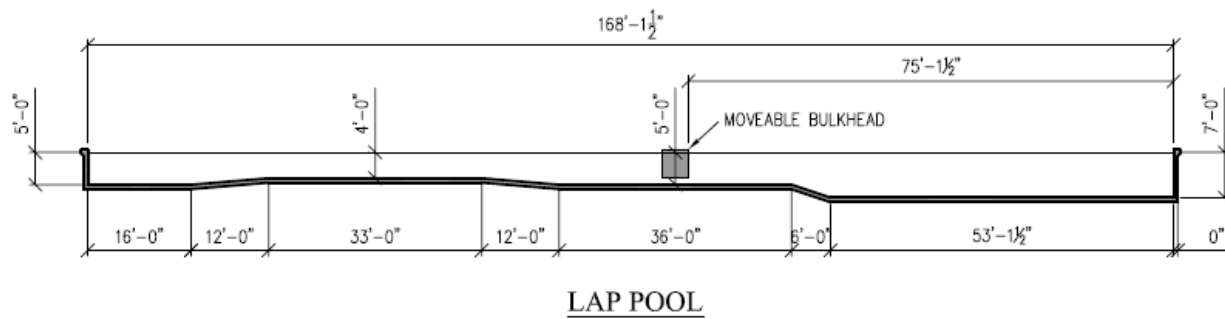
- a. Base bid includes: paving, lighting, signage, striping, sleeving, water, gas, sanitary sewer, storm sewer, electric, communication, and landscaping in and around base bid paving area and area defined as "building envelope".
- b. Option 1 includes: paving, lighting, signage, striping, sleeving, and landscaping in and around the option 1 paving area.
- c. Option 2 includes: paving, lighting, signage, striping, sleeving, storm sewer, and landscaping in and around the option 2 paving area.

2.1.1. Indoor Aquatics Facility Size: The Ft. Bliss Indoor Aquatics Facility will house four (4) different pools within one facility to serve the needs of the Ft. Bliss community. The minimum areas are as shown in the table below, and in the table in paragraph 2.1.3., for the base bid of 51,000 square feet.

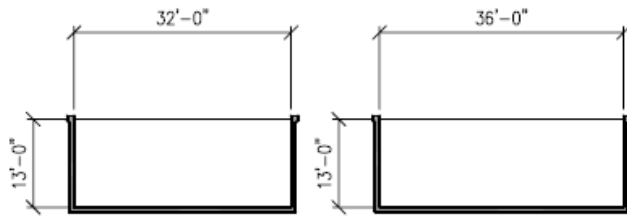
Base Bid	Minimum Net Area - Lap Pool (LP)	Minimum Net Area - Deep Water Training Tank (DWTT)	Minimum Net Area - Rough Water Training Tank (RWTT)	Minimum Net Area - Multi-Purpose Pool (MPP)
Function/Space				
Minimum Pool Surface Area (water only)	10,090	1160	5500	1800
Minimum Pool and Deck Area, including seating/lounging area	18,900	Inc. in Lap Pool	10,150	5000
Pool Office	150	Inc. in Lap Pool	150	Inc. in RWTT
Staff Room/First Aid	300	Inc. in Lap Pool	300	Inc. in RWTT
Spectator Area	900	300	0	0
Storage	600	0	300	100
SUBTOTAL:	20,850 SF	300 SF	10,900 SF	5100 SF

2.1.2. Modules: The following information applies to the base bid and options, if exercised, with the exception of the different sizes as indicated in the options in paragraph 2.1.4.

2.1.2.1. Lap pool. At minimum, provide a 50 m x 8 lane (60 feet wide) lap pool in the base bid. The width of 60 feet provides for 7 feet lanes with 2 feet between the sides of the pool and the outside lanes. Pool shall be appropriate for local swim competitions. Class of play for this pool shall be classified as IESNA Class II. Provide pool with a movable bulkhead that can be raised by blowing air into bulkhead chambers so it can be moved to designated locations in the pool (such as 50 m, 25 m, 25 yd, water polo, etc.). The overall length with the bulkhead at one end of the pool shall meet the competitive requirements of a 50 m pool. Maintain pool water in the 80 – 84 degree F range. Provide permanent lane markings on the bottom and ends of the pool (paint is not considered permanent) per competitive requirements. Provide starting blocks to allow for both 50 m and 25 yd events, with blocks at both ends. If the 5 feet depth area must be enlarged, decrease the 4 feet depth area accordingly. Depth shall range from 4 feet to a minimum of 7 feet inclusive, and the depths shall be as shown in the pool section below. The overflow system shall be concrete or stainless steel recessed or semi-recessed surge gutter. Provide a minimum deck space of 10 feet on the sides, 15 feet on the shallow end, and 15 feet between the lap pool and the Deep Water Training Tank. Provide permanent bleachers/seating for the lap pool to accommodate 200 – 240 spectators. Bleachers shall be 5 tiers or less. Bleachers shall be accessible directly from the dry corridor without requiring foot traffic across the pool deck, and shall also be directly accessible from the pool deck. Bleacher finish shall be light broom finish. Space must be provided for wheelchairs, and this space must be accessed from the dry corridor.

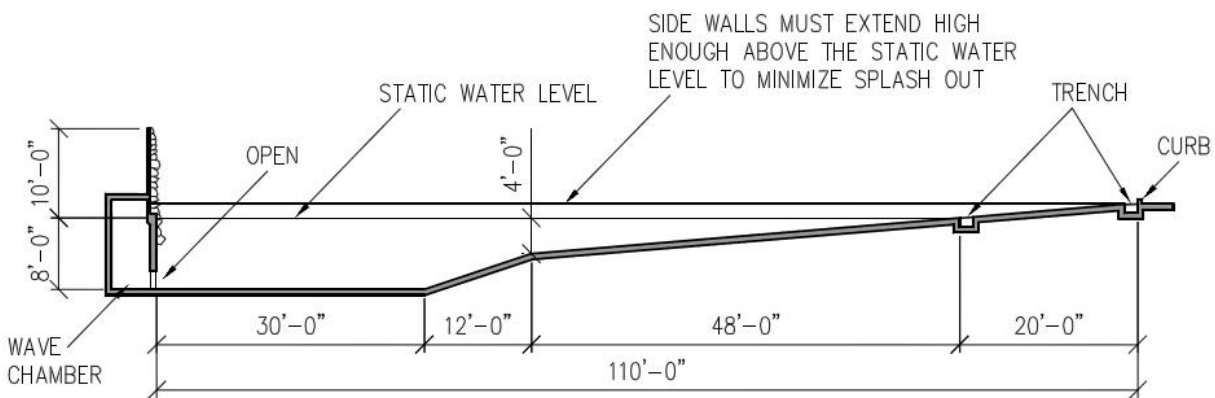


2.1.2.2 Deep Water Training Tank. Provide a 32' x 36' diving tank (in the base bid) with a 3 m platform (no board, platform only) and two 1 m diving boards. Depth shall be 13 feet. Collocate this tank with, but not physically connected to, the lap pool. Maintain pool water in the 80 – 84 degree F range. The overflow system shall be concrete or stainless steel recessed or semi-recessed gutter. Provide a recessed toe ledge at 4 feet below the water surface. Provide a minimum deck space of 10 feet on the sides of the tank, 15 feet between the Deep Water Training Tank and the Lap Pool, and 20 feet where the boards and platform are located. In addition, provide an additional deck area for staging and troop training. This deck space is shown on the schematic diagram. This deck area shall be a minimum of 2000 square feet in a contiguous and usable area that is roughly square. Provide permanent bleachers/seating for the deep water training tank to accommodate 60 - 100 spectators. Bleachers shall be 5 tiers or less. Bleachers shall be accessible directly from the dry corridor without requiring foot traffic across the pool deck, and shall also be directly accessible from the pool deck. Bleacher finish shall be light broom concrete. Space must be provided for wheelchairs, and this space must be accessed from the dry corridor. Design the structure over the Deep Water Training Tank to support a 5-ton overhead crane.



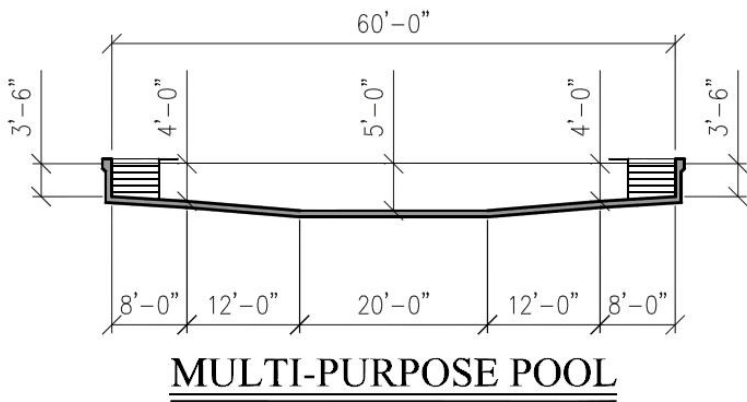
DEEP WATER TRAINING TANK

2.1.2.3. Rough Water Training Tank. Provide a pool with a minimum of 5500 square feet of water area (in the base bid), with zero-depth entry, designed similar to a commercial wave pool with the ability to adjust wave size (height of wave), shape (such as diamond or rolling, etc.), and symmetry (waves coming directly to shore, or going diagonal, etc.) to simulate varying ocean conditions. The pool may be rectangular, or may have a slight funnel shape. The deck for this pool shall exceed the minimums listed below to accommodate seating and circulation around the pool. Maintain pool water in the 80 – 84 degree F range. Provide minimum deck space of 10 feet on the sides of the tank, 20 feet at the deep end, and 15 feet at the beach end. The room must be able to be completely darkened and shall provide a high definition sound system for simulation of storms and other noises. Provide lighting systems to simulate lightning and search lights/beacons from helicopters overhead. Also, provide systems to simulate blowing rain or down draft from helicopter blades and to provide fog. Interconnect these systems by a computer system that allows for the selection of various scenarios ranging from calm ocean to raging seas. Provide a wave generator system designed to produce waves up to 4 feet high, from trough to crest, in the following patterns: Diamond, Double Diamond, Parallel, Split Wave, Left and Right Diagonals. Also provide a system that can create an undertow. The system shall be a pneumatic type where no component comes into direct contact with the water. Multiple pneumatic plunger systems shall not be acceptable. Contractor to provide a complete set of spare parts for one year's typical operation. Side walls of the tank must extend high enough above the static water level to accommodate waves with minimal splash out. Maximum depth of this pool shall be 8 feet. In addition, provide a bouldering wall, or shorter climbing wall on the end wall. Also on the end wall, provide a recessed toe ledge at 4 feet below the water surface. The wall should incorporate waterfalls similar to the active pool at the Southeast Missouri State University Aquatic Center. This pool will also be used for recreational purposes after training hours. The overflow system shall be skimmers on the walls and zero entry over flow trough. Install at least one permanently mounted lifeguard chair on the deck. Mount the emergency alarm described in paragraph 2.1.5.8. below to one of the fixed lifeguard chairs. A section through the length of this pool follows.



ROUGH WATER TRAINING TANK

2.1.2.4 Multipurpose Pool. Provide a pool, 30 feet wide by 60 feet long, that ranges in depth from 3.5 to 5 feet in the base bid. The section through the length of the pool is shown below. The stairs shown are outside the 30 feet width, and one set of stairs have 4 inch risers for ease of entering the pool. Provide a minimum deck space of 15 feet at both ends, and 10 feet on both sides. It is desired that the pool deck in this pool exceeds the minimums shown below to allow for additional seating and deck level storage. Pool water will be maintained in the 82 – 92 degree F range. This pool may be used for Shallow Water Egress Trainer (SWET) exercises, rehabilitation, soldier initiation to swimming, water exercise, as well as learn to swim and other recreational uses, such as water volleyball, during non training hours. Overflow system shall be surface skimmers or semi-recessed concrete or stainless steel gutter.



2.1.3. Other Functions: The following support functions are included in the facility. The areas provided In the table below are approximate. However, if the areas are reduced, the functionality of the space cannot be negatively impacted. Extra space in the areas below may be added to pool decks in table 2.1.1. above.

Base Bid	Function/Space (Areas are approximate)	Total
	Admin	800
	Training/Classroom	1000
	Showers/Lockers/Toilets to incl. Family Changing Rm	4400
	Pool Equipment and Chemical Storage	1560
	Mechanical Room	890
	Drying Room	200
	Laundry	100
	Miscellaneous - circulation, electrical, comm., and functions not listed above (such as lobby and control desk.). Also structure.	4900
SUBTOTAL:		13,850 SF

2.1.3.1. Admin area. Provide office space for the facility manager, 2 other staff, a receptionist, a break/work room, and a small conference room. In addition, centrally locate a control desk as a check-in point for everyone entering the facility. Provide the desk with the ability to monitor, either by direct view or by CCTV, the entrances to the locker rooms, and activity in each of the pool areas. Ceilings in these areas shall be 9 feet and shall be 2 feet x 2 feet tegular acoustical tile. Lighting shall be lay-in fluorescent fixtures that provide primarily indirect lighting. Office walls shall have STC rating of 45 or better. The conference room and break/work room shall have STC rating of 50 or better.

2.1.3.1.1. The office for the facility manager shall be a minimum of 120 net square feet, and shall be provided with modular carpet tiles. Furniture is to be a modular free-standing U-shaped workstation with additional filing and 2 guest chairs. The offices for the other staff shall be a minimum of 100 net square feet. The receptionist workstation shall be approximately 8 feet x 8 feet. Each office shall be provided with at least 2 data drops for computers on opposite walls to allow for different furniture arrangements.

2.1.3.1.2. The break/work room must provide a kitchenette with solid-surface counter and integral sink on base cabinets, and space for a microwave and minimum 18 cu. ft. refrigerator. The refrigerator shall be provided with water for an ice maker. In addition, a solid surface counter and base and wall cabinets will be provided for fax machine, printer, etc. Cabinets shall meet the construction requirements of paragraph 2.1.7.14. below. In addition, this room shall provide enough space for a table and 4 chairs. Provide data and electrical to support the equipment listed as a minimum.

2.1.3.1.3. The conference room shall provide space for 12 around the table and a minimum of 6 along one wall. Modular carpet tiles shall be used. Ceilings shall be 9 feet and shall be 2 feet x 2 feet tegular acoustical tile. Lighting shall be primarily indirect over the table, and a method for providing multiple lighting levels shall be provided.

2.1.3.1.4. The control desk shall be located in the Lobby and shall be able to monitor the main entrance into the facility in order to ensure all users appropriately check in. The control desk must also be able to monitor the entrances into the locker rooms and the different pool rooms either through direct visual contact, or through a CCTV system. In addition, CCTV will be used to monitor all of the pool areas.

2.1.3.2. Training/Classroom: The training/classroom shall be accessible from both the wet corridor and the dry corridor. This space must be capable of supporting classes of up to 50 with tables and chairs. Provide an electrically operated, recessed in the ceiling pull-down screen, minimum of 6 feet tall and 10 feet wide. Equip this room for a ceiling mounted projector, which includes the mounts (mounts and projector will be supplied by the Government, but installed by the Contractor), data, and electrical outlets. The front wall of the room must be provided with white boards for a minimum of 50% the width of the room. Provide electrical and data connections for TV and VCR/DVD. Ceiling shall be minimum of 10 feet tall with 2 feet x 2 feet tegular acoustical tile. Lighting levels shall be adjustable, with the ability to turn off all lights near the screen. Walls shall have an STC rating of 50 or better.

2.1.3.3. Locker Rooms. Provide separate lockers rooms for men and women. The locker rooms shall have dry access to the main circulation of the building, and wet access to all of the pools. Size the locker rooms and shower/toilet facilities based on a 65/35 to 60/40 ratio of men to women. Provide half-height Z-lockers. Provide benches either integral to the base of the locker or permanently attached between banks of lockers. Comply with ABA requirements. Provide a grooming area with mirrors, counter, and electrical outlets for personal hair dryers, etc. in both mens and women's locker rooms. Provide 2 spin-type swimming suit dryers in the men's locker room, and 2 spin-type swimming suit dryers in the women's locker room. Provide adequate toilet facilities for the participant load. See paragraph 2.1.6. for more information on Locker Rooms

2.1.3.4. Family Changing Rooms. Provide a minimum of 3 family changing rooms. Each changing room shall be provided with a shower, toilet, lavatory, diaper changing station, clothes hooks, and a fixed bench. Each room shall be lockable. Provide 1 spin-type swimming suit dryer in each family changing room. Outside of the changing rooms shall be a common area with a minimum of 40 half-height Z-lockers.

2.1.3.5. Pool support functions. This includes a Pool Office, Staff Room/First Aid Station, Storage, Chemical Storage, and Pool Equipment (to include the Rough Water simulator equipment).

2.1.3.5.1. Pool Office and Staff Room/First Aid Station: The pool office and/or staff room must have direct visual access of the pool for control and for better communication during an emergency or other incident. These areas must be finished appropriately for the damp environment. There will be one pool office and staff room for the lap pool/deep water training tank area, and the second pool office and staff room must serve both the rough water training tank and the multipurpose pool. The Pool Office will be provided with built-in solid surfacing counters on 3 walls. The staff room shall be provided with 8 full height lockers, of the same style and material as the locker room lockers, minimum 15" x 15" x 60". Provide a counter with solid surfacing counter top and integral sink on base cabinets that are appropriate for the wet environment. Metal, particle board and MDF are NOT acceptable. Provide space, electrical outlet, and water connection for a minimum 18 cu. ft. refrigerator in each staff room. This room will contain a table (maximum 36" x 72") and 6 chairs.

2.1.3.5.2. Service Areas: Locate all pool equipment and mechanical equipment rooms away from public access. Doors or openings shall be sized to permit the replacement of all equipment. Ventilation is required for motors and heaters. A service road must be provided to the Service Areas.

2.1.3.5.3. Chemical Storage: Provide separate chemical storage rooms for chlorine and every other chemical requiring isolated storage. Locate this storage area within the mechanical equipment compound or in a room adjacent to the pool equipment that is not accessible to the public, but facilitates the delivery of bulk chemicals. Vehicular access is required to the Chemical Storage room(s). Doors shall be secure from break-ins and warning signs shall be posted concerning chlorine storage and the need for protective clothing and equipment. The chemical storage room(s) shall be fire and explosion proof and shall have a vent fan capable of one complete air change in one to four minutes. OSHA approved eye wash station(s), gloves, and protective goggles are required in the pool equipment and chemical storage areas.

2.1.3.6. Lobby. Provide a lobby adjacent to the main entrance and the control desk. The lobby shall be a larger volume with upgraded finishes, similar to the Physical Fitness Facility across the street. The lobby shall provide a seating area and an area for at least 2 vending machines. In addition, the lobby will be provided with clear glass walls into the lap pool/deep water training tank area and into the multi-purpose pool area. The lobby shall also provide direct access to men's and women's restrooms for visitors, staff, and spectators. These restrooms will be separate from those in the locker rooms. See paragraph 2.1.7. below for more information on the lobby.

2.1.3.7. Laundry. Provide a laundry room with space for a commercial washer and dryer, laundry sink, bin type ice maker, and a folding area with cabinets. Provide a floor drain in this area. The washer, dryer, and ice maker will be Government furnished and Government installed.

2.1.3.8. Building support. Provide Mechanical, Electrical, Communications, and Janitor's Rooms as required. In addition, provide public toilets for spectators adjacent to the entry lobby. Provide circulation as required, avoiding the intermixing of dry and wet areas.

2.1.4. Tables of spaces for Options: The tables below provide the revised areas for Options 3 and 4. If one of these options are exercised, the appropriate tables will replace the tables in paragraphs 2.1.1. and 2.1.3. above.

OPTION 3: Increase of 8500 SF (Total of 59,500 SF Minimum)

Function/Space	Minimum Net Area - Lap Pool (LP)	Minimum Net Area - Deep Water Training Tank (DWTT)	Minimum Net Area - Rough Water Training Tank (RWTT)	Minimum Net Area - Multi-Purpose Pool (MPP)
Pool Surface Area (water only) MINIMUM	10,090 (60' wide)	1160 (~32' x ~36')	6050 (55' x 110')	2250 (30' x 75')
Pool and Deck Area, including seating/lounging area	20,500	Inc. in Lap Pool	10,900	7000
Pool Office	150	Inc. in Lap Pool	150	Inc. in RWTT
Staff Room/First Aid	300	Inc. in Lap Pool	300	Inc. in RWTT
Spectator Area (bleachers)	900	300	0	0
Storage	600	0	300	100
SUBTOTAL (MINIMUM):	22,450 SF	300 SF	11,650 SF	7100 SF

Function/Space (Areas are approximate)	Total
Admin	850
Training/Classroom	1200
Showers/Lockers/Toilets to incl. Family Changing Rm	5825
Pool Equipment and Chemical Storage	1600
Mechanical Room	2425
Drying Room	200
Laundry	100
Miscellaneous - circulation, electrical, comm., and functions not listed above (such as lobby and control desk.). Also structure.	5800
SUBTOTAL:	18,000 SF

OPTION 4: Increase of 13,010 SF (Total of 64,010 SF Maximum)

Function/Space	Minimum Net Area - Lap Pool (LP)	Minimum Net Area - Deep Water Training Tank (DWTT)	Minimum Net Area - Rough Water Training Tank (RWTT)	Minimum Net Area - Multi-Purpose Pool (MPP)
Pool Surface Area (water only)	11,440 (68' wide)	1600 (40' x 40')	6600 (60' x 110')	2625 (35 X 75)
Pool and Deck Area, including seating/lounging area	23,400	Inc. in Lap Pool	11,600	7400
Pool Office	150	Inc. in Lap Pool	150	Inc. in RWTT
Staff Room/First Aid	300	Inc. in Lap Pool	300	Inc. in RWTT
Spectator Area (bleachers)	900	300	0	0
Storage	600	0	300	100
SUBTOTAL:	25,350 SF	300 SF	12,350 SF	7500 SF

Function/Space (Areas are approximate)	Total
Admin	850
Training/Classroom	1200
Showers/Lockers/Toilets to incl. Family Changing Rm	6125
Pool Equipment and Chemical Storage	1600
Mechanical Room	2425

Drying Room	200
Laundry	100
Miscellaneous - circulation, electrical, comm., and functions not listed above (such as lobby and control desk.). Also structure.	6010
SUBTOTAL:	18,510 SF

2.1.5. Additional Requirements:

2.1.5.1. It is extremely important to maintain separation between dry and wet circulation. All pools must be accessible from the wet circulation. The dry circulation will connect the lobby with the training room and the locker rooms.

2.1.5.2. Wet entrances into the pool must be designed to accommodate some pools being closed, while others are in operation. In addition, the wet corridor may need to serve as a secondary means of egress from the locker rooms.

2.1.5.3. Pool decks shall be a minimum of 10 feet wide at the narrowest point on the sides of the pool, 15 feet wide at the narrowest point at the shallow end of the pool, and 20 feet wide at the narrowest point at the deep end of the pool. Pool decks shall be constructed of an impervious material, such as concrete, bluestone, ceramic tile, glazing tile, or other hard, non-slip surface. The deck area around the pool is considered a wet area and needs to be designed to prevent slipping when wet. Concrete surfaces of pool decks and benches shall be sealed, and sealed surfaces shall ensure a non-slip surface. Water shall not be allowed to puddle or pond on the deck area. All areas shall be pitched to provide positive drainage away from the pool with a minimum slope of 1/4 inch per foot and not more than 1/2 inch per foot. Water depths and "No Diving" signs that are integral to the deck surface shall be placed at the pool edge and inside the pool.

2.1.5.4. The facility will have one main entrance which is controlled by the Control Desk. The Rough Water Training Tank and Multi-Purpose Pool will have doors onto the outdoor staging/patio area as indicated in paragraph 2.1.5.7. below. The doors onto the staging/patio area will have hardware on the outside as well as the inside, and shall be complementary to the surrounding architecture. (ie. These doors may be storefront style doors). These doors will be alarmed, with the ability to deactivate the alarms at those pool areas. In addition, the alarm for the doors onto the staging/patio area shall have notification for the staff as to whether the doors are alarmed or not. All other doors from the facility, other than Mechanical and Pool Equipment exterior doors, shall be exit only. No hardware to be provided on the exterior of the exit only doors. The interior of those doors shall be provided with panic hardware that rings an alarm locally and at the control desk.

2.1.5.5. Each pool must be on its own filtration and heating systems. Pools may be used at different hours, and temperatures may vary throughout the day depending upon the use.

2.1.5.6. Each pool circulation and filtration system shall be provided with an automated UV Supplemental Sanitization system and an automatic water level control system. UV units shall operate within the UVC electromagnetic spectrum, emitting wave lengths in the range of 200 nm to 400 nm, must be NSF-50 listed, equipped with an automatic internal wiper, UV monitor, and energy control.

2.1.5.7. An outdoor staging/patio area shall be provided with direct access into the Rough Water Training Tank and the Multi-Purpose Pool. This patio shall be a minimum of 2000 square feet of paved area, and be surrounded with a fence and a lockable gate that is at least 8 feet wide and accessible for moving equipment if required. Provide provisions for some landscaped islands within the deck area. Provide some concrete seating around the inside perimeter. The fence and

gate must be tall enough to avoid uncontrolled access into the staging/patio area. The staging/patio area must be monitored by CCTV that is tied into the control desk. In addition the gate shall be alarmed with the ability for the control desk to disable the alarm.

2.1.5.8. All pool areas shall be provided with an emergency/accident alarm that rings an audible alarm in the pool room as well as notifies the control desk. In addition, the emergency alarm in the Rough Water Training Tank shall automatically shut off the waves, shut off the sound system, turn on the lights, and provide the audible alarm in the room and notification at the control desk. Alarms, other than alarms dictated by code, shall have user adjustable volume and shall have different tones to distinguish the alarms. User controlled volume cannot be reduced to zero.

2.1.5.9. All pool decks shall be provided with non-metallic linear trench drains on the deck. The deck shall slope towards the drain from both the pool and from the wall. The drain shall not be located against the wall. Drains on the deck must be drained to the sewer, and not be recirculated back into the pool

2.1.5.10. Provide minimum of 40 half-height solid plastic or color-through phenolic Z-lockers on the deck adjacent to each pool. Lockers must be a minimum of 15" wide and 18" deep. Minimum height is 60" per stack of 2 lockers. Place lockers on concrete curb for durability and ease of cleaning.

2.1.5.11. Provide a minimum of 2 shower heads on the deck for each pool. Locate these shower heads near the entrance into the pool area from the "wet" corridor. If the lap pool/deep water training tank area is provided with more than 1 entrance from the "wet" corridor, 2 shower heads will be required at each entrance.

2.1.5.12. Provide a boot wash near the main entry and at the gate entrance into the outdoor staging/patio area. Boot wash is to be within or immediately adjacent to these entrance point walkways with adequate concrete around at least two sides of the wash area to prevent people from stepping onto non concrete surfaces.

2.1.5.13. All filter systems shall be equipped with VFD's so that the flow rates can be adjusted to meet load conditions with the systems designed for the following minimum turnover rates: Lap Pool and Deep Water Training Tank: 4 hours; Rough Water Training Tank: 3 hours minimum with 2 hours preferred; Multi-Purpose Pool: 1 hour.

2.1.5.14. All Electric Water Coolers (EWC) shall be two-station ABA units. In the following list, "units" refer to the two-station ABA EWC. Provide one units in the wet corridor, dry corridor, and lobby. Provide a minimum of one of the units in each locker room. In the Lap Pool and Deep Water Training Tank, provide at least three units, in independent locations, with the three locations widely separated from each other and located at opposite sides of the room. In the Rough Water Training Tank, provide at least two units, in independent and remote locations. Provide at least one unit in the Multi-Purpose pool.

2.1.5.15. Provide sealed concrete floor in all mechanical, electrical, communication, and janitor spaces.

2.1.6. Locker/Shower/Toilet Rooms

2.1.6.1. FUNCTION/DESCRIPTION: Support space to facilitate changing before and after recreational activities. Half height lockers will be provided in each locker room. Showers are programmed to provide individual cubicles with dressing compartments.

2.1.6.2. ESSENTIAL DESIGN REQUIREMENTS: Individual shower stalls (minimum 36" x 36") and drying booths (minimum 36" x 36") for both the men's and women's locker rooms are required. The control desk must have either visual and/or CCTV control of all entrances into the

locker rooms. Do not place the entrances into the men's and women's locker rooms in one vestibule or at the same location. Provide some separation between the two entrances. No line of sight shall exist from outside to inside the locker/shower rooms, upon opening of the doors for ingress/egress. This may be accomplished through design of entry areas

2.1.6.3. DIRECT ADJACENCIES: Must be directly accessible from the dry corridors, and from the wet corridor which will lead directly to the different pools.

2.1.6.4. CEILING HEIGHT: In all areas shall be minimum of 9 feet.

2.1.6.5. MATERIAL DEFINITION:

"Wet areas" are defined as rooms where direct contact at walls and floors with water is expected. This includes showers, drying areas, grooming areas, and toilet areas directly adjacent to the showers. Wet areas may be considered "humid" space.

"Humid" is defined as above 60% relative humidity during typical room function over the entire period of normal hours of operation. Humid areas include locker rooms adjacent to showers and toilet rooms open to shower areas. Humidity varies by degree with "high" humidity occurring only in areas with continuous open water sources such as whirlpools, steam rooms, and swimming pool areas.

2.1.6.6. CEILING FINISHES:

General provisions: Highly light reflective and sound absorbent materials for locker areas. Provide 2 feet x 2 feet lay-in, wet-formed moisture resistant acoustical panels, on "humid" rated 15/16 inch "T" shaped metallic corrosive resistant grid system. Provide non-directional flush (square edge) tiles.

Sound absorption for acoustical panels: No less than .55NRC for standard tiles, .70 for film or ceramic faced units.

Locker Room - Humidity and mold resistance: Manufacturers offer "plastic" film faced units, ceramic, and painted finishes for humidity and mold control. Most standard tiles are "non-sag" but not mold resistant. Units shall be treated for low moisture absorption and mold formation.

Toilet and Shower - Humidity and mold resistance: Provide true plaster on mesh lath or plaster base (board) ceilings in shower rooms. Toilet rooms can use painted, suspended gypsum board ceilings. Where shower / toilet room combinations exist, use plaster finished ceilings of either type. Epoxy paint system typical throughout. Use dropped plaster soffits or false plaster beams between toilet / shower areas and locker rooms. This will divide ceiling systems and provide a barrier, at the ceiling line, for odor and moisture confinement to the higher humidity areas.

2.1.6.7. WALL MATERIALS:

Provide ceramic tile, full height in showers, behind toilets and urinals, and as a 4feet high wainscot throughout the room(s). Use gloss finish tiles. Consider creating a pattern of accent tiles or trims in complimentary colors to improve visual appearance. Avoid using darker colors as the main background color. Partial height ceramic tile or fiberglass panels in shower units are not allowed, however, use of corian, ½ inch solid plastic, marble/granite are acceptable options. Consider copying the ½ inch thick solid polymer system used in the new Physical Fitness Facility across the street. Use bullnose edge tiles at all outside corners. Use coved base tiles to match wall or floor system. Do not use wood base. Do not use rubber or vinyl base in wet areas.

Where ceramic tile is not used, epoxy paint system is required for optimum moisture and stain resistance.

2.1.6.8. FLOORING:

Locker rooms: Ceramic tile floor to match shower and toilet rooms.

Shower and toilet rooms: Ceramic mosaic tile. 2 inch x 2 inch maximum, 1 inch x 1 inch preferred. Mud set with floors sloped to drains. Slope to drain in showers (located one per cubicle), keep flat in toilet rooms with slight depression around floor drains. Overall floor slope should not exceed ½ inch in 10 feet- 0 inch. Wet and dry skid resistance is the priority. Non-glazed mosaic tiles for floor use are typically provided with a roughened face texture. Natural (flat) finish tile may also be satisfactory.

2.1.6.9. PLUMBING:

Plan on grouping toilets and urinals. Whenever possible, provide back to back toilet walls dividing mens' and womens' facilities. Lavatories should be on a separate wall, but grouped together in one counter assembly. Locker rooms and wet areas should be separated by a full-height barrier. Provide automatic sensors for faucets and toilets/urinals.

Floor drains: Provide one drain for each shower, and one floor drain per 250 square feet of floor area. Typically, one drain centered near toilet / urinal wall is adequate for unexpected overflows.

For each shower, provide low flow shower heads with a single push-button control with tempered water and metered flow.

Provide a hose bib under the sink in both of the toilet rooms. If a hose from these bibs cannot reach all areas in the locker/shower/toilet rooms, provide another hose bib, and protect it to avoid injury to patrons (such as recessing the hose bib to protect bare legs).

Water coolers as indicated above.

2.1.6.10. MECHANICAL (HVAC):

Mechanical heating, ventilation, and humidity control of the module is mandatory.

Operating range: System able to maintain 70 - 78 degrees (F) year-round at 50% relative humidity or less.

Air changes wet areas: 20-30 air changes per hour, negative pressure.

Air changes dry areas: (<50% RH) 8-12 air changes per hour, negative pressure and 0.50 CFM/ft².

Temperature controls: Independent to room, solid state and programmable. Ability to control peak and off-peak temperatures with 24 hour or one-touch setback programming recommended.

Air movement / control: Fully ducted supply and return. Dedicated supplemental exhaust for toilets. Passive or plenum return not recommended. Supply diffusers are to be adjustable metal grilles with four-way air movement and blade-type vanes. Return air grilles may be perforated plate or blade type. All diffusers to be pre-finished.

Ductwork shall be insulated sheet metal rectangular or circular duct routed adjacent to diffuser locations. Use flexible duct drops to diffusers. Natural (non-mechanically driven) ventilation is not allowed.

2.1.6.11. TECHNOLOGY/AV:

Ceiling mounted speaker for public announcements.

Provide mounts, and electrical/data connections for up to 4 wall mounted TV's in each locker room.

Sound system: Flush recessed ceiling speakers, 60 watt minimum output rating, capable of reproducing human speech, minimum.

2.1.6.12. WINDOWS AND DOORS:

Views into the space are prohibited. Doors and frames shall be corrosive resistant. Aluminum, galvanized hollow metal, or stainless steel hollow metal frames shall be utilized. Hollow metal frames shall be pre-finished to color selected by COR. Doors/access to the roof key per 6.5.4.2.g. All doors require door stops.

2.1.6.13. FIXED EQUIPMENT:

Lockers, benches, wall mounted hair/hand dryers. Shall provide plastic or color-through phenolic half-height "Z" lockers with non-corrosive hardware. Lockers must be a minimum of 15" wide and 18" deep. Minimum height is 60" per stack of 2 lockers. Provide a minimum of 240 lockers in the men's locker room, and a minimum of 160 lockers in the women's locker room. If option number 4 is provided, increase the minimum number of lockers to 300 in the men's and 200 in the women's. Provide shower curtain and rod for each shower between the shower and the dressing booth, and provide another shower curtain and rod for each dressing booth between the booth and circulation. Provide a towel pin/hook in each dressing booth, as well as a bench.

2.1.7. LOBBY AREA

2.1.7.1. FUNCTION/DESCRIPTION:

A transitional space used for visitors and users to check-in upon entry and orient themselves to various activities. Also provides a waiting area. A control counter within the lobby facilitates security procedures and way finding. The Lobby area consists of the Entry Lobby, Waiting/Display area, Control Desk, Equipment Storage, and Vending. In addition, the dry corridor shall follow the same requirements.

2.1.7.2. ESSENTIAL DESIGN REQUIREMENTS:

The Lobby must contain the Control Desk. The functions of the control desk include ensuring the staff can visually and physically control who enters the building. The desk must provide a convenient check-in arrangement, with high and low counters that comply with the requirements of the ABA. Staff must have visual access or total coverage video-surveillance of all of the pool areas. Staff must have visual access or video-surveillance of the entrances to the locker rooms. In addition, video-surveillance of the outdoor staging/patio area is required.

2.1.7.3. CEILING HEIGHT:

The intent for lobby ceiling design is to encourage interest and traffic into the facility. Bright, open volumes with views into the facility provide that impression. Though higher ceilings will require an increase in heat / cooling input, it is strongly desired that the facility utilize the largest volume possible within the space criteria guidelines. Ceiling height shall be no less than 10'-0" at any point except for a furr-down or other accent ceiling above the Control Desk.

2.1.7.4. CEILING FINISHES:

Highly reflective and sound absorbent materials. If an acoustical lay-in ceiling system is used, consider options for face design that introduce a distinctive element to the lobby space. Recommend use of tegular tiles if a lay-in system is used. Consider lighting placement and lamping types while considering ceiling design. The lobby is the primary area to consider decorative fixtures which may require areas of the ceiling reserved for pendant hung fixtures and/or up-lighting of ceiling features. See lighting guidelines below.

Additional Considerations: Other ceiling treatments are acceptable, as described below.

Accent functional areas, "mirror" floor patterns, or improve aesthetics by the addition of single layer, gypsum board "dropped" soffits or bulkheads on metal studs. Use of dropped soffits allows concealment of lower items (i.e. ceiling fans, structure, or utilities) while allowing the majority of ceiling to be increased in height. Install around perimeters of rooms, or across ceilings in an arrangement of "false beams." Area of solid, sound reflective surfaces should not exceed 15% of

the total ceiling area. "Modular" soffit arrangement: Where possible, design and size soffits and bulkheads to allow the use of full acoustical panels in each direction. For non-modular areas, center ceilings by using balanced border widths where panels are cut to fit.

If the lobby is a part of an overall large volume area, it is also appropriate to not provide a ceiling. Provide sound absorption through either suspended or wall-mounted acoustical panels or baffles. Consider use of a lower element over the control desk to provide a visual focal point and to bring the scale down to a more human scale.

Coordinate lighting: With direct lighting (recessed in ceiling) locate bulkheads and acoustical panel arrangements with the optimum lighting locations first, then consider the pattern of the panels and placement of bulkheads. Consider pendant hung decorative lighting. Where soffits exceed 36 inches in width and/or 12 inches in depth, consider supplemental lighting in the bottom of the soffit to avoid shadowed areas across the ceiling plane or at upper portions of wall planes.

2.1.7.5. WALL MATERIALS:

Consider use of accent materials or textures.

2.1.7.6. FLOORING:

Selection criteria are based on appearance, durability, and yearly maintenance.

Recommendations include terrazzo, porcelain tile, and ceramic tile. Each material has certain advantages / disadvantages. Sealed colored and patterned concrete may be considered as an option for lobby and circulation areas. Plain sealed concrete is not acceptable.

Resilient Tile is not allowed for lobby due to aesthetics and durability. Carpet is not allowed due to high frequency traffic and direct adjacency to the outside.

Each entry shall have a recessed mat, constructed of pre-finished metal retaining strips with nylon fiber, or shredded rubber inserts. Semi-open design. Floor mat recesses shall span the width of the entry opening or vestibule and be minimum of 6 feet long in the direction of travel. Mats are intended to be removable to facilitate periodic cleaning of the mat and the floor recess. Floor drains under the mats are optional but recommended for heavy rainfall or snowfall locations.

2.1.7.7. NATURAL LIGHTING:

Lobby appeal is enhanced by a combination of natural and artificial light. Provide clear glazing to the outside where possible. Centrally located skylight or clerestory window for hub type lobby or several smaller skylights/clerestories for linear spaces is highly recommended. Attempt to position natural light to accent control area. The Army prefers the use of clerestory windows over the use of skylights. High efficiency light tubes shall also be considered for use throughout the facility.

2.1.7.8. PLUMBING:

Provide electrically cooled, two station unit(s), designed for ABA use, linked to the public restroom function in or adjacent to the lobby, as indicated above.

2.1.7.9. MECHANICAL (HVAC):

Outside air infiltration should be controlled with use of a vestibule / airlock with two sets of entry doors.

Operating range: System able to maintain 68 F winter and 76 F summer at 50% relative humidity or less.

2.1.7.10. LIGHTING:

Main module lighting to be a combination of 1) recessed fluorescent lighting, which is primarily indirect, with pendant hung decorative lighting or 2) pendant hung direct / indirect fluorescent fixtures. Decorative wall sconces are recommended to accent functions or highlight focal points.

Provide lobby lighting control center at control desk. Dimming function is not required but should be considered. Ability to turn off some lights to account for natural daylighting is required.

Provide down lighting directly over all control desk counters.

Provide under cabinet lighting of counters where wall cabinets are used. Low profile LED lighting is acceptable under cabinet lighting. In addition, linear low profile fluorescent or "puck" style metal halide is acceptable. Metal halide system requires concealed low voltage power supply.

2.1.7.11 POWER:

Power to circuits as needed to Control Desk, for 2 computer terminals, card reader, counter mounted CCTV video monitors, multiplex video receiver, tape backup, sound processor for multiple paging sources, music source (such as a CD player) and sound amplifier.

Utilize custom raceway in casework. See Architectural Woodworking guidelines below.

2.1.7.12. TECHNOLOGY/AV:

Main power and communications needs are at the Control Desk.

Empty conduit routing, (recommend 2 inches min. diameter) for present or future video cabling from security camera sources around facility. Stub up into base cabinets and continue up into ceiling cavity above control desk. Conduit system is to be concealed, not exposed to view.

2.1.7.13. SOUND:

PA system shall be provided, and shall be controlled from the Control area. PA system shall be able to broadcast through the entire facility at once, or multiple rooms, or a single room. Shall be able to broadcast voice and music. Some of the pool areas have specific requirements. These requirements have been noted above.

2.1.7.14. FIXED EQUIPMENT:

Provide an electronic display in the lobby to broadcast cable TV, local television, as well as local events such as swim meet results, pool schedules, etc. Ensure that wiring, conduit, brackets, etc., are provided.

Architectural Woodwork: For the control counter, provide a visually attractive focal point for 1) entering patrons, 2) control and security functions, and 3) information. The control area shall be contiguous with both the Lobby and Fitness modules. Provide counters and casework for a minimum of two stations / control personnel within the desk area. Make provisions for lower counter for ABA access. Provide two tier counter system, more to block view of countertop clutter and controls, than as a privacy barrier. Direct visual control of lobby and fitness areas is critical. "Back wall" (if available) counters may be standard seating height for more extended paperwork functions. A minimum of 50% of the counter shall be standing height.

Casework: Premium grade. Recommend all wood construction for flexibility in configuration. Solid wood fronts, veneer plywood exposed sides and knee spaces. Recommend minimum ½ inch thick plywood for shelving 3 feet-0 inch wide and under and ¾ inch thick plywood for shelving over 3 feet-0 inch wide, with wood veneer or fused and bonded vinyl finish. Solid wood face edging for shelving and door edges.

Counters: Provide stone or solid polymer resin counters (plastic laminate is not acceptable). Provide 1 ½ inch dia. half round edges. Avoid square edges toward patrons. Drawer and door

hardware: to be commercial grade. Drawer glides to be side mounted, and use ball bearings and/or nylon wheels with minimum 75 lb. capacity for drawers less than 2.0 cu. ft, minimum 100 lb. capacity for drawers between 2.0 and 4.0 cu. ft., and minimum 150 lb. capacity for drawers larger than 4.0 cu. ft. Guides shall be provided with positive out and in stops. Use concealed door hinges and an integral pull or any metal cabinet pull style. Plastic or nylon pulls are not allowed. Provide through the counter grommets for covering holes needed for computer and device wiring from counter mounted devices.



Final Plan Diagram
05/01/2010



Final Plan Diagram
05/01/2010

2.2. SITE:

Provide all site improvements necessary to support the new building facilities. Refer to Paragraph 6.

Approximate area available 6.00 acres

2.3. GOVERNMENT-FURNISHED GOVERNMENT-INSTALLED EQUIPMENT (GFGI)

Coordinate with Government on GFGI item requirements and provide suitable structural support, brackets for projectors/VCRs/TVs, all utility connections and space with required clearances for all GFGI items. Fire extinguishers are GF/GI personal property, while fire extinguisher brackets and cabinets are Contractor furnished and installed CF/CI. All Computers and related hardware, copiers, faxes, printers, video projectors, VCRs and TVs are GFGI.

The following are also GFGI items: Washer, gas dryer, ice maker, refrigerator, microwave, exercise equipment (i.e. racks for noodles, flotation devices, foam bars), rescue stretcher, 2 ADA ramps, and 2 ADA chair lifts. A ceiling mounted projector in classroom is government furnished, contractor installed.

2.4. FURNITURE REQUIREMENTS

Provide furniture design for all spaces listed in Chapter 3 and including any existing furniture and equipment to be re-used. Coordinate with the user to define requirements for furniture systems, movable furniture, storage systems, equipment, any existing items to be reused, etc. Early coordination of furniture design is required for a complete and usable facility.

The procurement and installation of furniture is NOT included in this contract. Furniture will be provided and installed under a separate furniture vendor/installer contract. The general contractor shall accommodate that effort with allowance for entry of the furniture vendor/installer onto this project site at the appropriate time to permit completion of the furniture installation for a complete and usable facility to coincide with the Beneficial Occupancy Date (BOD) of this project. The furniture vendor/installer contract will include all electrical pre-wiring and the whips for final connection to the building electrical systems however; the general contractor shall make the final connections to the building electrical systems under this contract. Furthermore, the general contractor shall provide all Information/Technology (IT) wiring (i.e. LAN, phone, etc.) up to and including the face plate of all freestanding and/or systems furniture desk tops as applicable, the services to install the cable and face plates in the furniture, the coordination with the furniture vendor/installer to accomplish the installation at the appropriate time, and all the final IT connections to the building systems under this contract.

The Government reserves the right to change the method for procurement of and installation of furniture to Contractor Furnished/Contractor Installed (CF/CI). CF/CI furniture will require competitive open market procurement by the Contractor using the Furniture, Fixtures and Equipment (FF&E) package.

2.5. NOT USED

3.0 INDOOR AQUATICS FACILITY

3.1. FUNCTIONAL/OPERATIONAL REQUIREMENTS

Comply with the American College of Sports Medicine (ACSM) Health/Fitness Facility Standards and Guidelines and the Technical Criteria – U.S. Army Physical Fitness Facilities (no older than the October 2003 edition), except where modified by this document.

- (a) Reference material for comparable private sector facilities is accessible from the American College of Sports Medicine website: http://www.acsm.org/AM/Template.cfm?Section=Home_Page
- (b) Examples of private sector State-of-the-Art athletic facilities may be found at the Athletic Business website: <http://athleticbusiness.com/galleries/ArchitecturalShowcase.aspx>
- (c) The design of the pools and supporting equipment must be performed by a firm with published aquatic facility design experience, and must either be a preferred provider for USA Swimming (www.usaswimming.org) or have designed at least 2 facilities published in the Athletic Business Architectural Showcase within the last 5 years.
- (d) The Contractor must take samples and analyze the potable water supply. They shall prepare a calculation for each pool of what it takes to bring it into balance according to Langlier Saturation Index. In addition, the Contractor must prepare a video to show how to maintain this balance.
- (e) The Contractor must provide an operation manual and video training on the equipment as well as on-site training every 30 days for the first 90 days starting at the completion of the facility. The person providing equipment training must be a Certified Pool Operator. After the pool has been in operation for 30 days the Contractor shall provide a Certified Pool Operator class for all personnel who will be involved in any aspect of the maintenance or operation of the pools. O&M manual to include maintenance procedures and life cycles for all pool related equipment including anticipated costs for annual maintenance.
- (f) QARs, QC Managers, inspectors, etc. must have documented experience with larger scale commercial pool construction
- (g) Pool Related Warranties:
 - (1) Defects in the pool structure resulting in a loss of water-5 years
 - (2) Defects in the pool piping systems resulting in a loss of water-5 years
 - (3) Filter Warranty
 - i. Tank and tank lining 10 years
 - ii. Internal Filter Components 10 years
 - iii. Valve bodies 5 years
 - iv. Valve operators, controller and bump mechanisms 1 year
 - v. Remainder of filter system components 1 year
 - (4) Deck equipment 1 year
 - (5) Defects in material or installation of all mechanical equipment not specifically mentioned 1 year
 - (6) Ultra Violet Supplemental Sanitization System 5 years (not including consumables having a limited life such as wiper blades, wiper bushings, UV lamps, quartz sleeves, and seals).
 - (7) Sanitizer feed system 1 year
 - (8) pH feed system 1 year

3.1.1. Accessibility Requirements

All aquatic facility functional areas shall be barrier-free and accessible to people with disabilities as required by the Architectural Barriers Act (ABA). Site, sidewalks, building, and pool designs shall enable people with disabilities to act independently and enjoy the full range of programs provided. Level changes may be included, but must be accommodated by ramps suitable for wheelchair access, both indoors and outdoors. Accessible entry to pools may be accomplished by utilizing zero entry depth ramps with ABA compliant handrails or by lift and assistance equipment designed specifically for people with disabilities. Utilize lifts that do not require assistance by another person, and that are operated by rechargeable batteries. The need for special equipment, such as transfer benches, crane lifts, or ramps into the pool shall be considered during the design process.

3.1.2. Functional Space Requirements

The functional space and design must comply with the criteria provided within section 01 10 00 of this RFP.

3.1.3. Facility Betterments

3.1.3.1. Provide an intrusion detection alarm system in the facility.

3.1.4. Pool and Spa Safety

In accordance with VIRGINIA GRAEME BAKER POOL AND SPA SAFETY ACT, PUBLIC LAW 110-140, each public pool and spa in the United States shall be equipped with anti-entrapment devices or systems that comply with the ASME/ANSI A112.19.8 performance standard, or any successor standard; and each public pool and spa in the United States with a single main drain other than an unblockable drain shall be equipped, at a minimum, with one or more of the following devices or systems designed to prevent entrapment by pool or spa drains:

- (a) Safety vacuum release system.--A safety vacuum release system which ceases operation of the pump, reverses the circulation flow, or otherwise provides a vacuum release at a suction outlet when a blockage is detected, that has been tested by an independent third party and found to conform to ASME/ANSI standard A112.19.17 or ASTM standard F2387.
- (b) Suction-limiting vent system.--A suction-limiting vent system with a tamper-resistant atmospheric opening.
- (c) Gravity drainage system.--A gravity drainage system that utilizes a collector tank.
- (d) Automatic pump shut-off system.--An automatic pump shut-off system.
- (e) Drain disablement.--A device or system that disables the drain.
- (f) Other systems.--Any other system determined by the Commission to be equally effective as, or better than, the systems described in (a) through (e) of this paragraph at preventing or eliminating the risk of injury or death associated with pool drainage systems.
- (g) Outlet covers located in less than 6 feet of water shall be unblockable covers, flush with the floor rather than domed, to avoid trip hazards.

3.2. SITE PLANNING AND DESIGN

Organize the site to be compatible with the site planning and style of adjacent existing structures. Locate the building to reflect local climatic conditions. For example, provide protection from prevailing winds and glare. Locate the building to take advantage of passive solar heating and day lighting. Provide a wider sidewalk, designed with site features, to serve the main entry. Provide sidewalks to all doors in accordance with ABA.

Bidders are responsible for the construction of all site work shown in the Site Package for the base bid and all awarded bid options.

3.2.1. Landscaping

Choose a plant selection from the list of acceptable plants as provided in Appendix I. Comply with the local Installation landscape standards.

Take into consideration sustainable design issues when designing the landscape. Select plants that require little to no additional water beyond normal rainfall. Avoid plants that require an irrigation system.

In addition, Antiterrorism/Force Protection requirements must be considered when designing the landscape.

3.3. ARCHITECTURAL REQUIREMENTS

3.3.1. Building Exterior

Design the facility to enhance or complement the visual environment of the Installation. The building entrance shall be architecturally defined and easily seen. When practical, exterior materials, roof forms, and detailing shall be compatible with the surrounding development and adjacent buildings on the Installation and follow locally established architectural themes. Use durable materials that are easy to maintain. Provide large glass areas

where fitness equipment is located to provide visual interest from the outside, and views from the inside. Use glass in other areas as appropriate, taking into consideration glare, direct solar heat gain, and other functional requirements. Design the building exterior using energy efficient strategies and technologies to meet overall energy performance requirements.

- 3.3.1.1. Trim and Flashing: All exterior metals including gutters, downspouts, and fascias shall be factory pre-finished metal, aluminum, or galvanized steel base metal with baked-on or bonded high-performance fluoropolymer coating, fabricated and installed in compliance with SMACNA Architectural Sheet Metal Manual.
- 3.3.1.2. Bird Habitat Mitigation: Provide details necessary to eliminate the congregating and/or nesting of birds at, on, or in the facility.
- 3.3.1.3. Exterior Doors and Frames

On this requirement, Paragraph 3 overrides Paragraph 6.

(a) Main Entrance Doors: Provide aluminum storefront doors and frames with Architectural Class 1 anodized finish (color selected by the Contracting Officer from the manufacturer's full line of standard colors), fully glazed, and with medium or wide stile are preferred for entry lobbies or corridors. Storefront systems shall comply with wind load requirements of applicable codes and UFC 4-010-01 requirements. Framing systems shall have thermal-break design.

(b) Doors to Outdoor Staging/Patio area: Doors from the Multi-Purpose Pool and Rough Water Training Tank shall meet the architectural style of the wall in which they are placed. They shall be alarmed, however, the alarm shall be controlled locally so that the doors can be used to freely circulate between the outdoor staging/patio area and these 2 pools. The system(s) provided must comply with applicable codes and UFC 4-010-01 requirements.

(c) Side Entrance/Exit Doors: Exterior doors and frames opening to spaces other than corridors or lobbies shall be insulated hollow metal of 316L STAINLESS STEEL PAINTED WITH HIGH PERFORMANCE COATING, or aluminum (to avoid corrosion) and comply with SDI/DOOR A250.8 Recommended Specification for Standard Steel Doors and Frames. Fire-rated openings shall comply with NFPA 80 Standard for Fire Doors and Other Opening Protectives, and the requirements of the labeling authority. Door and frame installation shall comply with applicable codes and UFC 4-010-01 requirements. Alarm all doors other than the main entrance door and notify the control desk if the door is opened.

(d) Exterior Door Finish Hardware: All hardware and accessories in the facility shall be consistent and shall conform to BHMA A156 Series Standards, Grade 1. Coordinate door hardware and security requirements with the functional requirements, the Room-by Room Criteria, and the electrical security/fire alarm system requirements of this document. Provide bored Locks in accordance with BHMA A156.2 Bored and Preassembled Locks and Latches. Provide all hardware necessary to meet the requirements of NFPA 80 for fire doors and NFPA 101 for all exit doors and BHMA A156.3 Exit Devices. Provide closers on all exterior doors, fire-rated doors, doors into pool areas, locker room, and restroom doors. The Main Entrance door is considered a high traffic door that requires a high quality door closing mechanism complying with BHMA A156.4 Door Controls - Closers with adequate strength to ensure safe and easy operation in a high wind environment. Hardware finish shall be type 316L stainless steel. Doors leading directly outside from LAP POOL AND DEEP WATER TRAINING TANK AND FROM GATE FROM THE OUTDOOR STAGING AREA do not require any hardware on the exterior side of the door.

(e) Refer to paragraph 3.3.2.4 for more information on door and hardware finishes.

3.3.1.4. Exterior Windows: Provide non-operable windows.

3.3.1.5. Exterior Glass and Glazing: Provide the thickness required to provide necessary sound deadening properties for the exterior walls. Unless a curtain wall configuration, the rating of the exterior glass shall be within 5 decibels of the wall to which it is installed. Allow for as much natural daylighting throughout the facility as possible, through the use of clear glazing and translucent panels. In the lap pool and diving tank, pay special attention to glare for competitors, life guards, and spectators. In the

rough water simulator, it is necessary to have the room completely darkened for training exercises. However, natural daylighting for other times is still desired. Natatoriums should not have deck-level windows in walls facing pool ends to prevent glare. Deck level windows at the side should be tinted.

- 3.3.1.6. Thermal Insulation: Provide exterior wall, floor, and roof/ceiling assemblies with thermal transmittance (U-values) required to comply with the proposed energy calculations for the facility. Do not install insulation directly on top of suspended acoustical panel ceilings.
- 3.3.1.7. Exterior Louvers: Design exterior louvers to exclude wind-driven rain, with bird screens and made to withstand a wind loads in accordance with the applicable codes. Wall louvers shall bear the AMCA certified ratings program seal for air performance and water penetration in accordance with AMCA 500-D Laboratory Methods of Testing Dampers for Rating and AMCA 511 Certified Ratings Program for Air Control Devices.
- 3.3.1.8. Exterior Paint Systems: Exterior Paint Systems shall be based on and comply with the recommendations of the Master Painters Institute (MPI) for the substrate to be painted and the environmental conditions existing at the project site. Exterior surfaces, except those from factory pre-finished material, shall be painted with a minimum one prime coat and two finish coats. No lead paints are acceptable. For exterior applications provide an MPI gloss Level 5 finish (semi-gloss), unless otherwise specified. Apply all paints in accordance with the manufacturer's specifications.
- 3.3.1.9. Roof Access Points: Provide primary access to the roof through a mechanical room, and accommodate any roof elevation changes via fixed exterior ladders between roof surfaces.

3.3.2. Building Interior

- 3.3.2.1. Space Configuration: Arrange spaces in an efficient and functional manner. Structure interior spaces to allow maximum flexibility and ease of circulation. Separate circulation paths must be provided for dry (visitors, patrons in street-shoes, etc.) and wet (patrons headed to and from the pools). Provide glass panels between functions when appropriate to enhance the open concept of the facility. Maximize use of natural lighting and daylighting within the constraints of the applicable codes and UFC 4-010-01.
- 3.3.2.2. Material and Finishes: Interior surfaces, details, finishes, fixtures, and fittings shall be carefully selected for resistance to corrosion, wear, impact, and vandalism. Because of the high humidity associated with pools and showers, all materials selected shall be resistant to water and mildew. Use only non-hydroscopic materials in pool areas; i.e. 304 stainless shall be used rather than 316L stainless. Utilize professional interior designers with experience in aquatic facility design. Interior design selections shall be based on consideration of anticipated use, maintenance characteristics, life cycle cost, fire protection, and other safety requirements. Appearance retention is the top priority for building related finishes. Provide low maintenance, easily cleaned room finishes that are commercially standard for the facility occupancy specified, unless noted otherwise. In general, use neutral tones with contrasts. Bright color accents or schemes may be considered for areas where appropriate. Facility should have a bright and energetic feel. Use local materials to the greatest extent practicable to reinforce the user's sense of place or region.
 - 3.3.2.2.1. Flooring: Floor and deck surfaces in wet areas must be slip resistant. Utilize non-skid ceramic tile, concrete, or other skid resistant material for natatorium floors and in areas adjacent to the pool deck (such as pool office, staff room, etc.). Concrete surfaces of pool decks and benches shall be sealed, and sealed surfaces shall ensure a non-slip surface. Tile floors shall be 1 inch x 1 inch or 2 inches x 2 inches maximum. All floors shall have adequate slope and drains to prevent standing water. Vinyl Composition Tile is not allowed in this facility.
 - 3.3.2.2.2. Interior Walls: Wall surfaces shall be selected to minimize abrasions in case of accidents or stumbles by customers and staff. Depending upon project specific requirements, walls may be painted CMU block, painted masonry, moisture resistant gypsum board, Portland cement plaster, or high strength gypsum plaster. Comply with ASTM C 36 Gypsum Wallboard. Minimum panel thickness shall be 5/8 inch. Use of gypsum board is restricted to the lobby and admin areas only. Consider use of impact resistant gypsum board. Ceramic tile may be installed either full height or as a wainscot.

- 3.3.2.2.3. Ceilings: Ceilings should utilize acoustic, moisture-resistant materials, like sealed wood, moisture resistant gypsum board, plaster, galvanized metal, or other factory finishes impervious to water and mildew. Concepts such as exposed structure in lieu of acoustical tile ceilings may be utilized in many different areas. The minimum pool ceiling height above the water surface for the deep water training tank is based on the 3 m platform. The lowest element in the ceiling must be a minimum of 10 feet above the surface of the platform. Natatoriums should not have deck-level windows in walls facing pool ends to prevent glare. Deck level windows at the side should be tinted.
- 3.3.2.2.4. Paint: Comply with the recommendations of the Master Painters Institute (MPI) on interior paint systems for the substrate to be painted and the interior environmental conditions existing at the project site. Apply a minimum of one prime coat and two finish coats on interior surfaces, except factory pre-finished material or interior surfaces receiving other finishes. Lead paints are not acceptable. In dry areas, provide an MPI Gloss Level 3 or 4, with 4 being preferred for ease of cleaning. In wet areas, provide an MPI Gloss Level 5 (semi-gloss) finish. Apply all paints in accordance with manufacturer's instructions.
- 3.3.2.3. Building Circulation: Circulation schemes must support easy way-finding within the building. Consider locating the control desk on the right side as you enter the facility to avoid cross traffic conflicts when entering the facility. Ensure wet circulation is kept separate from dry circulation.
- 3.3.2.4. Interior Doors and Frames

On this requirement, Paragraph 3 overrides Paragraph 6.

- (a) Hollow Metal Doors: Comply with SDI/DOOR A250.8. Doors shall be minimum Level 2, physical performance Level B, Model 2; factory primed. Hollow metal doors shall be mounted in hollow metal frames. Doors shall be 316L stainless steel, painted with high performance coating (to avoid corrosion).
- (b) Hollow Metal Frames: Comply with SDI/DOOR A250.8. Frames shall be minimum Level 2, 16 gauge, with continuously welded corners and seamless face joints; factory primed. Frames shall be 316L stainless steel, painted with high performance coating (to avoid corrosion).
- (c) Side Lites: Provide ¼ inch clear tempered glass at all door lites.
- (d) Interior Door Hardware: Door hardware and security requirements must be coordinated with the functional requirements, the room-by-room criteria, and the electrical security/fire alarm requirements. At a minimum, provide closers on all fire-rated doors, locker room doors, and restroom doors. If possible, utilize "airport" entrances to locker rooms and other applicable areas to minimize wear on finishes and hardware. Hardware finish shall be type 316L stainless steel.

NOTE: AS AN ALTERNATIVE TO STAINLESS STEEL DOOR AND FRAMES, FIB-R-DORS COULD BE UTILIZED. THESE WOULD BE THE BEST DOORS AND FRAMES FOR DOORS LEADING DIRECTLY TO THE POOLS.

- (e) Interior doors shall be rated the same as the wall in which they are installed.
- 3.3.2.5. Casework: Provide casework complying with AWI Section 400, Custom Grade flush overlay cabinets with stained wood. Work surfaces and counters shall be solid surfacing material or a material with at least the same durability qualities. Laminate countertops are not allowed. Install casework complying with AWI Section 1700.
- 3.3.2.6. Interior Windows: Provide minimum ¼ inch clear tempered glass. Provide STC rated windows that meet required STC rating of the wall it is located.
- 3.3.2.7. Signage: Provide interior signage for overall way finding and life safety requirements. Interior signage is important to support the functionality of the facility and for wayfinding. Use signs with words and graphic symbols, where appropriate. Interior signage shall comply with accessibility requirements for the visually impaired. Interior signage shall be horizontal only and in upper and lower case text, except where specifically required to be in all capital letters according to ADA

requirements. The comprehensive interior plan shall be from one manufacturer and shall include the following sign types: (1) Lobby Directory; (2) Directional Signs; (3) Room Identifications signs; (4) Building Service signs; (5) Regulatory signs; (6) Official and Unofficial Signs; (7) Visual Communication Boards.

- 3.3.2.8. Window Treatments: Provide window blinds or an appropriate type of window treatment on all exterior windows in administrative spaces. The rough water simulation room must be capable of being darkened for training exercises.
- 3.3.2.9. Bulletin Boards: Provide bulletin boards in the lobby and main corridors. Bulletin boards shall fit into an overall architectural theme. Bulletin boards shall be fabric covered. The intent is to avoid randomly placed bulletin boards that are not coordinated with the interior finishes, colors, and/or theme.
- 3.3.2.10. Corner Guards: On gypsum board walls, provide surface-mounted, high impact integral color rigid vinyl corner guards where necessary to reduce the potential for damage (i.e. in areas subject to high traffic and where carts or other mobile pieces may be used.). Provide stainless steel corner guards at all outside corners of ceramic tile walls where necessary to reduce the potential for damage (i.e. in areas subject to high traffic and where carts or other mobile pieces may be used.).
- 3.3.2.11. Mold Prevention: Design and construct buildings to maintain space humidity at reasonable levels. Building construction shall be relatively air tight. Locate vapor barriers, if used, where temperature is above dewpoint in both heating and cooling seasons, and not under insulation installed on top of a ceiling at a ventilated attic. Acoustical ceiling tiles shall have factory applied mold preventive and sag resistant physical properties. Any gypsum board product utilized within this facility shall be certified to achieve a mold-resistance level of 10, in accordance with ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the surface of Interior Coatings in an Environmental Chamber.

3.3.3. Image

Since this facility is related in function to the Physical Fitness Facility, this facility shall be similar in materials, design, and details to the Physical Fitness Facility across the street. This includes not only the exterior of the facility, but the interior finishes as well.

3.3.4. Special Acoustical Requirements

Acoustics must be considered in the design to minimize reverberation. Use of ceiling and/or wall mounted panels may be utilized as long as the panels are appropriate for the humid environment, and will not require constant maintenance. Design and construct exterior walls and roof/ceiling assemblies, doors, windows and interior partitions to provide for attenuation of external noise sources such as airfields in accordance with applicable criteria. In accordance with the American College of Sports Medicine's "Health/Fitness Facility Standards and Guidelines, 2nd Edition", an indoor pool shall have a minimum STC rating of 50 and a measured reverberation time of 0.8 to 1.4 s. The minimum background Noise Criterion (NC) level for an indoor pool is 38. Minimize the noise transmission from the rough water training tank into other spaces.

3.3.5. Moisture Resistive Construction

- 3.3.5.1. Avoid the use of fire proofing that may absorb moisture.
- 3.3.5.2. Utilize exposed roof construction in pool areas to avoid build-up within void of roof/ceiling system.
- 3.3.5.3. Avoid use of perforated acoustical metal deck which may permit moisture to accumulate in insulation above metal deck.
- 3.3.5.4. Utilize CMU or similar moisture resistive materials for wall construction, or finished wall surface, of pool areas to reduce deterioration from moisture and physical abuse.

3.4. POOL REQUIREMENTS

3.4.1. Ladders and Grab Rails:

Steps and ladders shall be recessed or set into the pool wall. No ledges or projections are permitted under the water surface. Maximum spacing between grab rails shall be approximately 60 feet. Locate grab rails and recessed steps at both ends of the long walls near the corners for 25-meter pools. Intermediate grab rails shall be provided on 50-meter or uniquely shaped pools. Where diving boards and platforms are provided, locate a ladder with grab rails no more than 16 feet, 5 inches from a diving board/platform to get users out of the water quickly. This enables users to essentially head right back toward the edge of the pool directly, so the next diver can proceed safely. Provide a recessed toe ledge at 4' below the water surface in the deep water training tank. Position ladders so that swimmers don't have to cross the landing areas of diving boards/platforms if at all possible. This allows lifeguards to keep their focus at all times on the area around the boards and platform by eliminating the need to track an exiting swimmer that has to leave the immediate area of the board or platform, which makes supervising the next diver or slider problematic.

3.4.2. Depth Markings

Unless requirements of local, state, or national codes are more stringent, depth markers are required at each 1 foot increment of water depth, at maximum and minimum depths, at transitions between deep and shallow water, and at diving areas. Shallow pool areas 5 feet or less shall be labeled with the international no diving symbol. Depth markers shall be located on the pool deck beside the pool edge and on the vertical side of the pool wall or gutter system above the water line so they are visible from inside the pool. The figures shall be at least 4 inches high, in a color that contrasts with the background. Depths shall be provided in both feet and meters. Mark a black or dark blue line at least 4 inches wide on a sloping pool bottom wherever the depth reaches 5 feet.

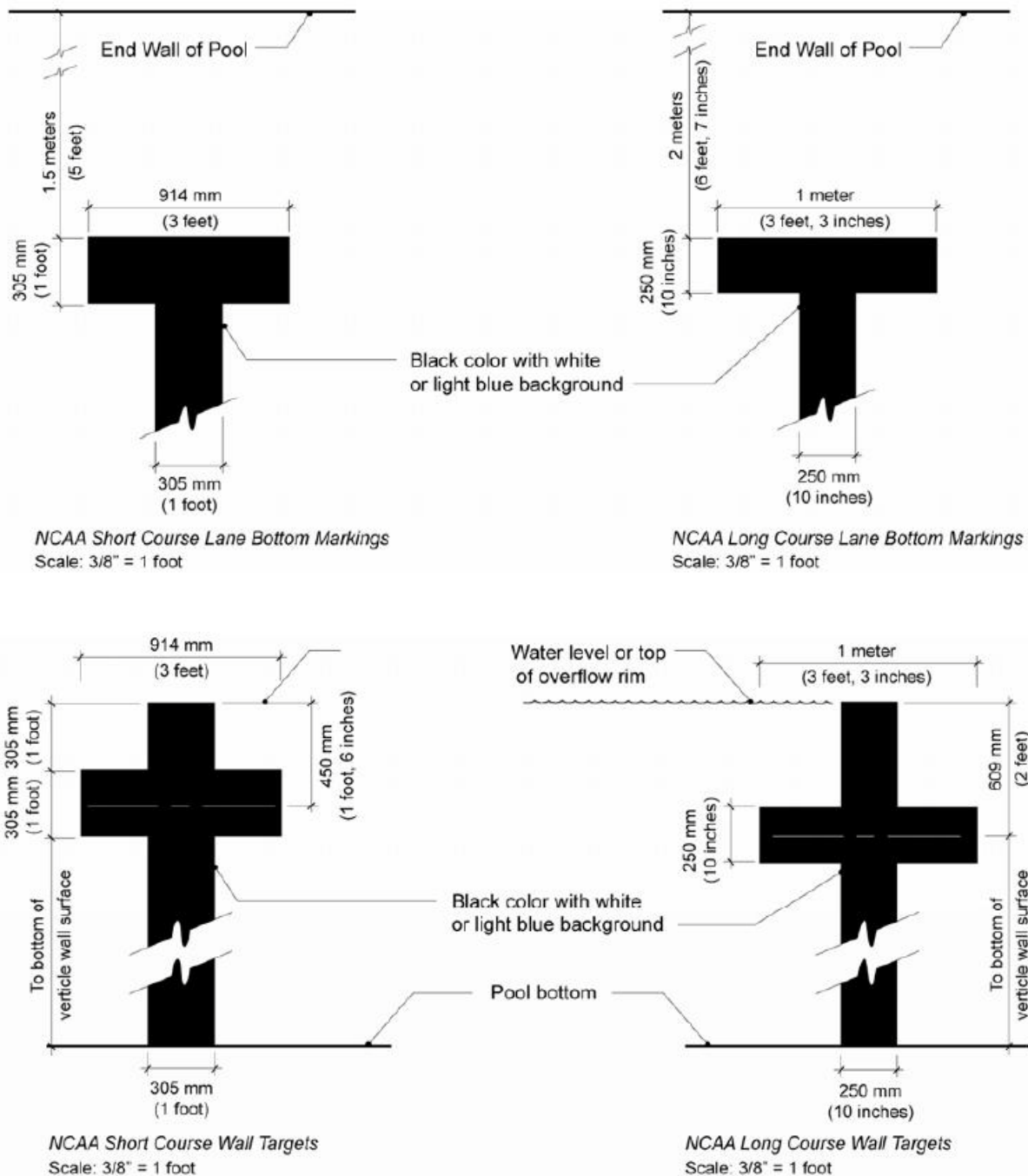
3.4.3. Competitive Swimming

Local swim competitions may be held at this facility, and therefore lane and target markings, starting blocks, and timing system must be provided. Consider the following sources for more information:

- **NCAA** – [National Collegiate Athletic Association](#)
- **USS** – [USA Swimming](#)

- 3.4.3.1. Lane and Area Dividers: Lane dividers shall be wave quelling disk-type which run the full length of the lanes. Lane Dividers must be in multiple sections to allow for 50 m, 25 m, and 25 yd lanes. Area dividers consist of a set of continuous floats strung on a cable or cord. They are attached at hoops anchored in the pool walls.
- 3.4.3.2. Racing Lanes and Target Markings: Provide racing lane and target markings according to the appropriate governing entity that may be involved in competitive events (NCAA, FINA, etc.). Provide a recall line (for backstroke events) suspended above the racing course at least 4 feet above the water surface. For a 25-meter course, it shall be located 40 feet from the starting end. For a 50-meter course, it shall be located 50 feet from the starting end. Racing lines and targets shall be tile.
- 3.4.3.3. Starting Platforms: Starting platforms shall be supplied for each course lane in the pool area. Starting platforms shall be maximum of 2 feet, 6 inches above the water level. The front edge shall be flush with the vertical end wall of the course. Platform widths shall be a minimum of 20 inches. Platforms shall be sloped at not more than 10 degrees and shall be covered with a non-skid finish. Number starting platforms beginning with lane one to swimmer's right as they face the course. Provide anchors embedded into the pool deck, as appropriate for the starting platforms to be utilized. Platforms shall be provided at both ends of 50 m and 25 yd courses. Platforms must be a style and design acceptable to the sanctioning body.

3.4.3.2-1 Figure: Racing Lane Markings



3.4.3.4. Timing System

The lap pool shall be provided with a complete timing system that includes the touch pads, score board, and sound system for the starting gun. Provide finish contact pads. Contact pads shall be a minimum of 6 feet, 6 inches wide by 2 feet in depth. They shall be installed in a fixed position in the center of the lane and flush with the water level.

3.4.3.5. Diving and Deep Water Areas

This area is used for competitive diving, recreational diving, scuba training, survival training, and other activities requiring deep water. A separate tank shall be provided for the deep water training tank. Tank depth shall be 13 feet-0 inch minimum. Deep water tank must comply with the requirements of Federation Internationale de Natation (FINA).

3.4.3.5.1. Diving Boards and Platforms

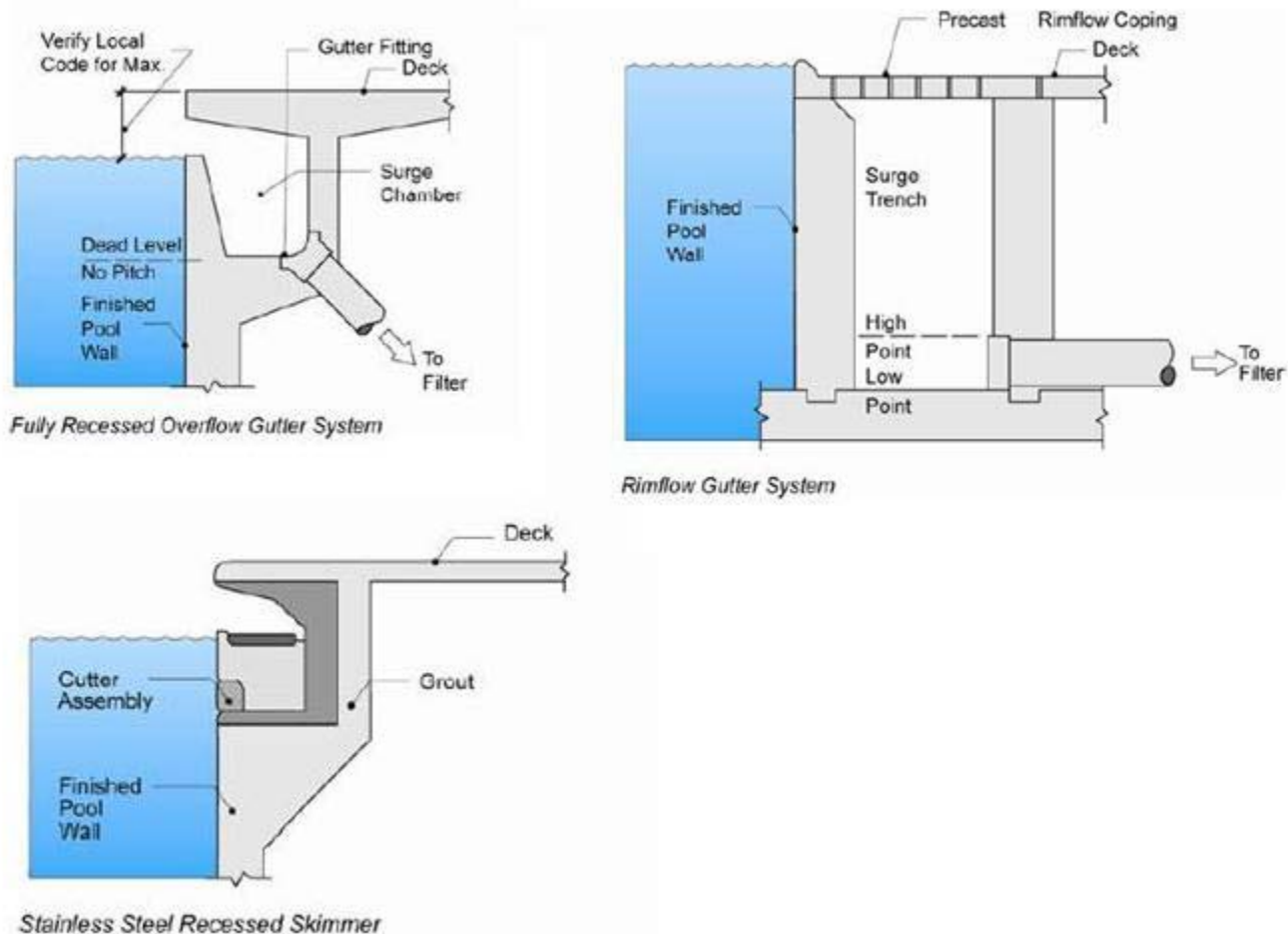
Provide aluminum competition springboards for the 2 – 1 m boards. Springboard dimensions are 16 feet long and 1 foot, 8 inches wide. The installation shall be level. Springboard anchors shall be embedded in the pool deck. The fulcrum shall be adjustable through a range of 2 feet forward from a point 5 feet, 6 inches from the rear anchor of the board. The fulcrum mechanism shall be covered to prevent injury to fingers or toes. Provide a water surface agitator under each 1 meter diving board and the 3 meter platform to increase diver visibility utilizing water jets from the overflow system or air bubble inlets in the pool bottom.

3.5. NATATORIUM TECHNICAL REQUIREMENTS

3.5.1. Overflow Systems

A continuous overflow perimeter system is recommended in the main pool. Examples of this system are shown in 3.5.1-1 *Figure: Overflow Rim Systems*. Prefabricated, stainless steel surge gutter systems are preferred because they provide constant skimming of the surface water to help remove debris and provide surge storage capacity for water displaced by swimmers. Scuppers that utilize a thin layer of water falling over a weir may be used to skim water from wading and training pools; however they do not adequately handle the surge requirements of main pools. Antiquated scum gutters offer little surface collection effectiveness and are generally used in conjunction with surge storage tanks and pump pits

3.5.1-1 *Figure: Acceptable Overflow Rim Systems*



3.5.2. Circulation and Filter Systems

All portions of the water distribution system serving the swimming pool and auxiliary facilities shall be protected against backflow. Water introduced into the pool, either directly or into the circulation system, shall be supplied through air gap fittings. There shall be no direct physical connection between the sanitary or storm sewer system and any drain from the swimming pool recirculation system. Provisions shall be made for complete, continuous

circulation of water through all parts of the swimming pool by appropriately sized, non-corrosive pipes. Heavy grades of schedule 40 polyvinyl chloride (PVC) or schedule 80 in active seismic zones may be utilized for most circulation piping requirements. The valves and draining system for the pool shall be sized to prevent flooding (surcharging) of the sanitary or storm drainage system. Circulation piping shall be designed for a maximum velocity of 10 feet per second. All suction piping shall be designed for a maximum of 6 feet per second. A hair and lint filter of stainless steel with removable basket shall be provided to filter and remove leaves, hair, and other solids entering the drainage system. A centrifugal circulation pump shall be provided of sufficient capacity to provide the minimum turnover rate to the pool, plus an additional allowance of 30%. Provide VFD's so that the flow rates can be adjusted to meet load conditions with the systems designed for the following minimum turnover rates: Lap Pool and Deep Water Training Tank: 4 hours; Rough Water Training Tank: 3 hours minimum with 2 hours preferred; Multi-Purpose Pool: 1 hour.

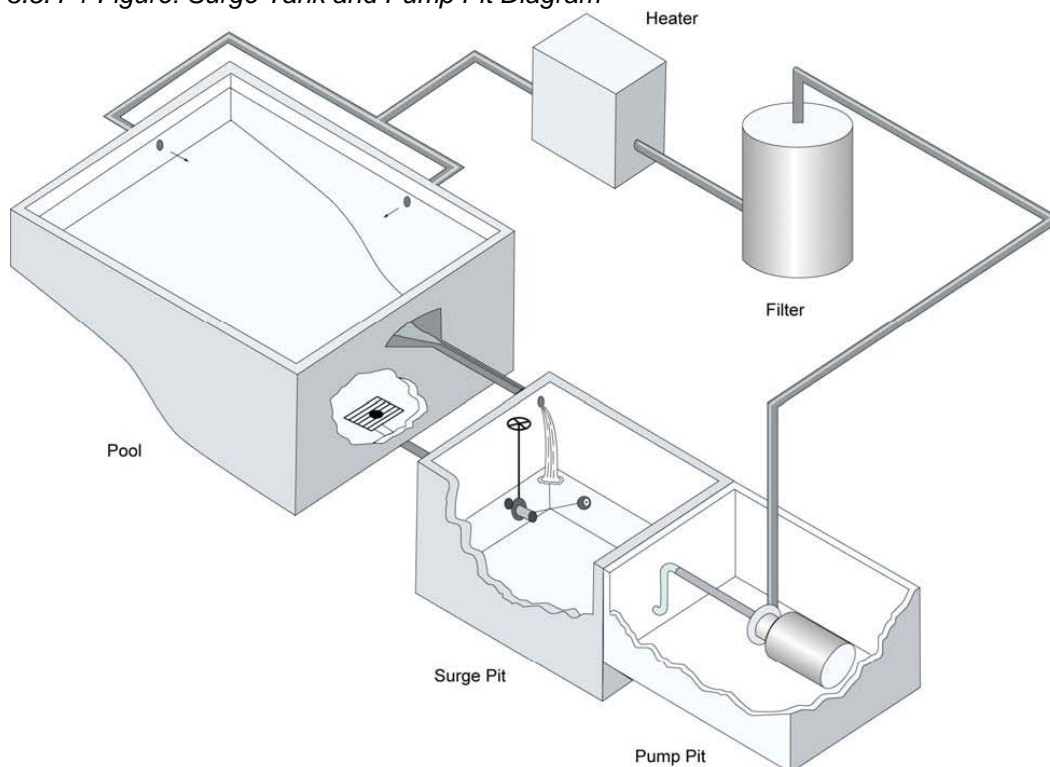
3.5.3. Recirculation System Minimum Requirements

A recirculation system, consisting of pumps, piping, filters, feeders, water conditioning equipment, city water make-up, surge tank, and other accessories shall be provided to clarify and disinfect the pools. Under normal operating conditions, water shall be re-circulated from the main drain and through the overflow gutter into the circulating pumps. Approximately 30% of the water shall enter the main drain, while 70% "skims" over the gutter system through the surge tank and hence into the pumping system. The main drain outlet and piping must be capable of 100% of the required recirculation. The gutter or surface skimmers must be capable of 100% of the required recirculation. Additional information concerning swimming pool layout and recirculation requirements can be found at the National Swimming Pool Foundation website. All integral capacity motors shall meet the requirements for Premium Efficiency Motors per EPA05.

3.5.4. Surge Tanks and Surge Control

Circulation systems shall be equipped with concrete, cast-in-place surge tanks. The purpose of the surge tank is to allow water displaced by pool occupants to be collected in the surge tank and later returned to the pool as occupancy decreases. Surge tanks shall have surge capacity of 1 gallon per square foot of water surface area. Provide flow control valves to modulate water flow from the main drain and from the surge tank. A surge tank and pump pit diagram is provided in 3.5.4-1 *Figure: Surge Tank and Pump Pit*.

3.5.4-1 *Figure: Surge Tank and Pump Pit Diagram*



3.5.5. Motor Controls and Auxiliaries

Provide magnetic starters for the control of the circulation pump. Do not use stainless steel enclosures for electrical equipment due to susceptibility to corrosion. Use NEMA 3R FRP components for all electrical and control items subject to corrosion. All filter pump motors shall have VFD's.

3.5.6. Pumps

Pumps are utilized to displace a liquid or gas to create a directed flow and many different types of pumps may be required for pool equipment, such as chemical feed pumps, transfer pumps, vacuum pumps, circulation pumps, booster pumps, hydrotherapy pumps, and compressor pumps. All pumps should be flooded suction, only fractional or small horse power pumps designed for special uses, such as draining pools, should be self-priming pumps. Utilize mesh-bucket filters immediately in front of circulation pumps to protect the internal components of the pump from larger, solid objects and to strain hair and lint from the re-circulating water. A pump pit may be required adjacent to the surge tank to circulate water for filtration, heating (if required), and return it to the pool.

3.5.7. Flow Meters

Provide a flow meter in each main line serving a swimming pool or wading pool. Flow meters are also demanded by the health department codes in most states and provinces. Install flow meters on a straight, uninterrupted section of pipe at least 10 pipe diameters down-stream from the last fitting with about five diameters distance "clean run" beyond so that the smooth, linear flow is not disturbed to ensure accurate readings. In addition, provide a mercury type manometer flow meter at the discharge of the circulating pump to control primary flow and backwash. Provide a flow control valve so that the operator may manually control the circulation rate of the pump, thereby maintaining the turnover rate throughout a filter cycle from clean to dirty.

3.5.8. Filters

Filtration is the physical process of removing soils which would interfere or impede the disinfection process if not removed. Filters only remove solids and any dissolved elements must be removed as part of the disinfection process. Filters shall be automatic regenerative media filters utilizing perlite (Diatomaceous is not acceptable), with a dry feed vacuum transfer pump, programmable bump mechanism, operate at a maximum flow rate of 1.3 gpm/sf and backwash by gravity drain. Filters must be backwashed periodically according to the manufacturer's specifications and discharged directly into the sanitary or storm sewer where allowed by code.

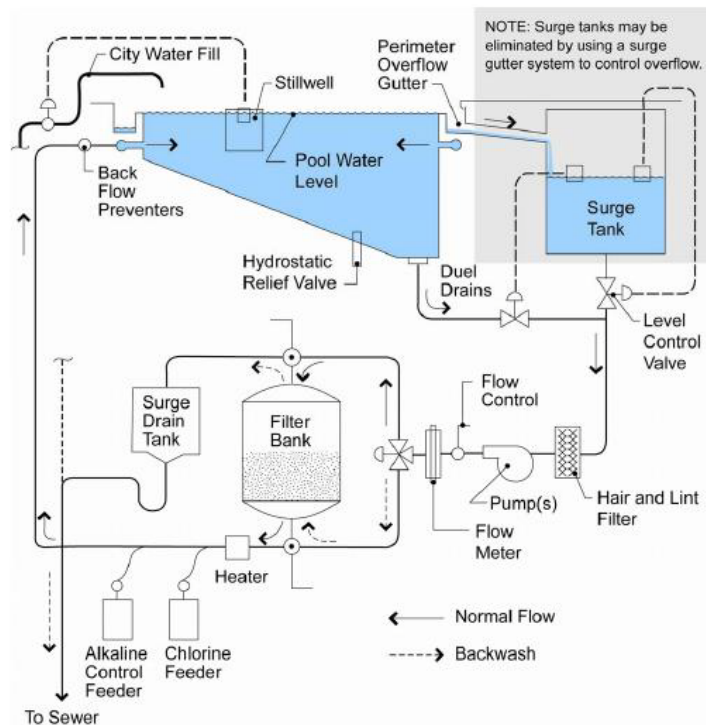
3.5.9. Drains and Inlets

Dual main pool drains are mandatory to prevent entrapment hazards unless the single drain is "unblockable" as defined by ASME A112.19.8a-2008. Inlets and drains shall not protrude into the pool or allow entrapment of extremities. Drains and drain covers to be tamper proof and entrapment proof. Refer to the current guidance provided by the Consumer Product Safety Commission publication "Guidelines for Entrapment Hazards: Making Pools and Spas Safer" for information regarding the prevention of entrapment hazards. At least one main drain will be provided in the deepest part of the swimming pool. For pools at least 30 feet wide, multiple drains will be spaced no more than 15 feet from a side wall.

Each drain shall have a removable but secure grate that has sufficient area to maintain water velocity at or below 1 foot, 6 inches per second. One inlet shall be provided for each 300 sq. feet or 15,000 gallons, whichever is greater and all inlets will be located on the pool sides or floor in a manner that completely distributes the water. Utilize butterfly, ball and globe style inlet valves made partially or completely of PVC or other high quality plastic for new pools and renovations. Fresh water may also be supplied through a fill spout at least 6 inches above the pool deck.

All pools will comply with the VIRGINIA GRAEME BAKER POOL AND SPA SAFETY ACT, PUBLIC LAW 110-140 To prevent injuries and to slightly disturb the water for better diver visibility in the diving area, this spout shall have no sharp edges and be located under one of the diving boards.

3.5.9-1 Figure: Water Circulation Systems Schematic



3.5.10. Pool Vacuum

Provide a pump, mounted on stainless cart with 50' to 100' cord, water proof switch, GFI protector, and barbed hose fittings on suction and discharge. Pump shall be 110 volt either 3/4 HP or 1 HP. Prefer a 50' cord and 3/4 HP because of reduced issues with over loading and kicking the circuit breakers. Properly sized outlets shall be located around the pool perimeter based on a 50' cord.

In addition to the vacuum pump provide two 1.5" x 50' vac hoses with coupler, 1.5" x 20' discharge hose, 22" vac head and either a 12' x 24' fiberglass telescoping vacuum pole or three 8' stainless steel poles connected to make a 24' pole.

This equipment shall be included as part of the pool construction package.

3.5.11. Hydrostatic Uplift Prevention

Verify level of water table and possibility of accumulation of water in the areas occupied by pools and water chambers. Provide system of relief drains to relieve hydrostatic pressure and prevent uplift of pools and water chambers which may be subject to hydrostatic uplift pressure when pools and water chambers are empty.

3.5.12. Heating and Water Temperature

Heaters are necessary for all indoor pools. The selected water heater shall have the capacity to bring the pool up to the desired temperature within 24 hours. Pool heaters to meet the requirements of EPA05 and ASHRAE 90.1.

3.5.13. Water Quality

The design and method for pool disinfection must be coordinated with the installation. Use of chlorine gas is not allowed.

Automatic Chemical Controllers are required which measure ORP and pH (this is part of the BLS).

An Ultra Violet (UV) System is required for supplemental disinfection/ sanitation. Each pool shall be provided with an automated UV system and an automatic fill system. UV units shall operate within the UVC electromagnetic spectrum, emitting wave lengths in the range of 200 nm to 400 nm, must be NSF-50 listed, equipped with an

automatic internal wiper, UV monitor, and energy control.

3.5.14. Pool Lighting

Surface Lighting for the Deep Water Training Tank, the Rough Water Training Tank, and the Multi-Purpose Pool shall provide a minimum of 40 foot-candles of illumination on the deck and pool surface with the pool basin illuminance computed/provided per IESNA RP-6-01 Recommended Practice for Sports and Recreational Area Lighting, paragraph 5.17.2 Illuminance Criteria (Pool Basin). As a minimum, Lap Pool lighting shall be provided per IESNA RP-6-01 Recommended Practice for Sports and Recreational Area Lighting for Class II "Class of Play". LUMINAIRES SHALL NOT BE INSTALLED ABOVE THE WATER SURFACE.

Area lighting should be designed to reduce direct glare and reflections on the water surface. Ground fault circuit interrupters (GFCI) are required for all electrical equipment (vending machines, pool lights, water coolers, etc.). Provide power sources for additional lighting that may be needed for television, movies, and special events.

3.5.15. Underwater Lighting Criteria

Provide LED underwater lighting. Underwater lighting types and dimensions shall conform to the National Electric Code (NEC) Article 680 regulations and shall comply with the IESNA Class of Play.

Low voltage wiring should be used for all dry or wet niche lighting fixtures. This requires a transformer located, by code, a specific distance away from the pool wall and above deck. Either wet niche or dry niche fixtures may be used as described in 3.5.13-1 Table: *Underwater Lighting Criteria*.

Strongly recommend utilizing LED lighting for underwater lighting. Expect to provide ½ watt/SF of surface area or equivalent for LED.

3.5.14-1 Table: *Underwater Lighting Criteria*

	Description	Installation Technique	Installation Depth	Servicing Technique
Wet Niche	Completely sealed but removable fixture that is constantly surrounded by water.	Mounted into recess in pool wall.	Maximum depth of 6100 mm (2 feet) from pool water surface.	Extra rubber covered electrical cord is coiled in the niche. Fixture is removed from niche and lifted to deck for servicing.
Dry Niche	Permanently enclosed fixture that doesn't come into contact with water.	Installed behind pool wall and covered by glass sealed to a metal frame with gaskets.	Can be installed at any depth, usually 6100 mm (2 feet) below shallow water surface.	Serviced via a pipe tunnel or manhole behind the pool wall.

3.5.16. Testing Adjusting and Balancing

Test and balance pool systems and equipment, using a firm certified for testing and balancing by the Associated Air Balance Council (AABC), National Environmental Balancing Bureau (NEBB), or the Testing Adjusting, and Balancing Bureau (TABB). The prime contractor shall hire the TAB firm directly, not through a subcontractor. Perform TAB in accordance with the requirements of the standard under which the TAB Firm's are approved. All recommendations and suggested practices contained in the TAB Standard shall be considered mandatory. All quality assurance provisions of the TAB Standard such as performance guarantees shall be part of this contract. For systems or system components not covered in the TAB Standard, the TAB Specialist shall develop TAB Procedures.

3.5.17. Commissioning

Commission all Pool systems, equipment and controls in accordance with ASHRAE Guideline 0. Hire a Commissioning Authority (CA), certified as a CA by AABC, NEBB or TABB as described in Guideline 0. The CA will be an independent subcontractor and not an employee of the Contractor nor an employee of subcontractor of any other subcontractor on this project, including the design professionals (i.e., the DOR or their firm(s)). The CA will communicate and report directly to the Government in execution of commissioning activities. The Contracting

Officer's Representative will act as the Owner's representative in performance of the duties spelled out under OWNER in Annex F of ASHRAE Guideline 0.

3.6. STRUCTURAL REQUIREMENTS

Provide all steel reinforcing, framing, members and deck with appropriate moisture resistant factory prime coating for use in pool environment. Coating to be compatible with finish coatings noted. Facility foundation system including pools shall be designed for maximum resistance to settlement based upon unique building type and specific soil conditions of site.

- 3.6.1. The structural system for the facility shall be chosen with consideration for durability, constructability, economy, and all loads applicable to the life of the structure.
- 3.6.2. The structural system shall compliment the architectural objectives of the facility.
- 3.6.3. Column-free spaces may be desirable for some areas of the facility and shall be coordinated with architecture.
- 3.6.4. The structural design criteria are contained in the basic contract and are included by reference in the UFC 1-200-01 in the basic contract.
- 3.6.5. The model building code shall be the most current version of the IBC with the applicable substitutions in coordination with the NFPA and the Antiterrorism requirements, if applicable.
- 3.6.6. The material codes shall be those referenced in the model building code.
- 3.6.7. Geotechnical investigation has revealed the presence of CL and CH soils at the site, as detailed in Appendix A. Account for them in the facility's design.

3.7. MECHANICAL REQUIREMENTS

3.7.1. Fire Protection

Provide facilities with automatic sprinklers that provide 100 percent coverage of the facility. Take care to avoid freezing sprinkler pipes located in attic spaces. Portions of the sprinkler system subject to freezing may be pre-action sprinkler systems. Piping material shall be appropriate for the corrosive environment, and shall be exposed to view.

The fire alarm notification and the mass notification systems must be in separate panels.

3.7.2. Plumbing

Provide facilities with a fully functional plumbing system that complies with the International Plumbing Code (IPC). Water for showers and lavatories shall be provided with tempered automatic mixing valves with a water temperature of 100 - 105°F. Showers shall be provided with push-button control, lavatories shall be provided with automatic sensor control. Shut off valves shall be provided at all plumbing fixtures. Floor drains shall be provided in all dressing rooms, shower rooms, toilet areas, and janitor's closets. Provide domestic hot and cold water, sanitary and storm drainage, plus propane or natural gas systems (if required). Provide metering that provides a pulse input into the Utility Monitoring and Control System (UMCS) for gas service, if utilized. Hot and cold water shall be supplied to all restrooms, sinks, and janitor's closets. Hot water temperature shall not exceed 105°F at the outlet. Provide hose bibs to enable hose access to the entire pool deck. Provide hose bibs in the shower/locker/toilets and family change rooms to allow hosing down walls, etc. Provide a water meter that provides a pulse input into the Utility Monitoring and Control System to monitor water usage.

3.7.3. Heating, Ventilating and Air-Conditioning (HVAC)

- 3.7.3.1. Mechanical systems for natatoriums must be capable of maintaining an indoor air temperature of 3 degrees F above the water temperature at the highest temperature of the ranges given previously. Maintain relative humidity of 50-60%, and ventilation of at least 4 complete air changes per hour during high occupancy. Pool water temperature shall be monitored and be provided as an input to the HVAC Control System in order to maintain the indoor air temperature 3 degrees higher than the

water temperature. The potential for mold growth and deterioration of materials throughout the facility should be anticipated and minimized with proper mechanical design (example, ducted instead of plenum return air) and wall transmission values. Air velocity in the immediate pool area should be minimal. Provide heating, ventilating, and air conditioning (HVAC) systems in compliance with [UFC 3-410-01FA](#), *Design: Heating, Ventilating, and Air Conditioning* and [UFC 3-410-02A](#), *Design: Heating, Ventilating, and Air Conditioning (HVAC) Control Systems*. Also comply with the recommendations of the [American Society of Heating, Refrigeration, and Air Conditioning Engineers](#) (ASHRAE), where applicable.

- 3.7.3.2. Provide a night setback for the HVAC system and zone control for maintaining different environmental conditions in each required functional area. Provide tamper proof digital thermostats that are programmable and located where they may be internally controlled by the aquatic facility manager. Utilize security features so that thermostats are only accessible to authorized personnel. Design of new facilities shall ensure that building energy consumption shall not exceed the DoD energy budget figures. Provide Energy Monitoring and Control System (EMCS) monitoring controls. Perform a life cycle cost analysis of available energy sources and design the HVAC system to comply with the requirements of the most current edition of the International Mechanical Code (IMC).
- 3.7.3.3. Provide facilities with a fully functional HVAC system that is automatically controlled by a Building Automation System (BAS). Provide for air flow from the dry side of the Men's And Women's Locker/Dressing/Shower/Toilet space to the exhaust intakes in the wet area.
- 3.7.3.4. Air changes should be controlled by the users based on the occupant load.
- 3.7.3.5. Recommend the use of heat exchangers to use waste heat to heat water, etc. Also use dehumidification heat to heat pool water.
- 3.7.3.6. Comply with AT/FP requirements in the design of HVAC systems. Incorporate energy efficiency as a primary design consideration, including consideration of passive solar design applications. Consider optimum sized active solar space heating and domestic hot water heating systems.

3.8. ELECTRICAL REQUIREMENTS

Electrical power, lighting and telecommunications shall be provided to the facility in accordance with APPLICABLE CRITERIA in accordance with GENERAL TECHNICAL REQUIREMENTS, in accordance with all IEEE Standards (including Recommended Practice) where the scope is applicable to this design effort, in accordance with all UL Standards where the UL scope is applicable to this design effort and where itemized, in the combined interdisciplinary areas cited and where itemized herein. Provide electric service and distribution equipment, wiring receptacles and grounding, interior and exterior lighting and control, emergency lighting, telephone, communication systems, fire alarm, other health and safety alarms, and intrusion systems in accordance with NFPA 70, National Electrical Code; IEEE/ANSI C2, National Electrical Safety Code; and the latest Installation design requirements.

Perform a short circuit study as an integral part of selecting and sizing electrical distribution components (all equipment shall be fully rated; that is, do not use series-combination rated equipment). Perform a coordination study to ensure that protective device settings are appropriate for the expected range of conditions (depending on the design and construction schedule, it is acceptable to design adequate protective devices with adjustable features, followed by a coordination study required during construction to specify the correct settings.) Circuit breakers, disconnect switches, and other devices that meet the OSHA definition of energy-isolating device must be lockable. Do not exceed 5 percent combined voltage drop on feeders and branch circuits if the transformer providing service is located within the facility. If the transformer is located exterior to the facility, limit the combined voltage drop for service conductors, feeders, and branch circuits to 5 percent. Individual voltage drop on branch circuits should not exceed 3 percent. Branch circuits supplying sensitive circuits should be limited to 1 percent voltage drop. Service grounding system and all wiring methods must meet the current NFPA 70 requirements. All electrical equipment must be Underwriters Laboratories (UL) listed or published proof of safety and performance from an approved independent testing laboratory shall be provided. All service equipment must be Underwriters Laboratories (UL) listed as service equipment. Alternately, published proof from an approved independent testing laboratory may be provided. Provide electrical metering of the natatorium and provide monitoring of the electrical meter by Utility Monitoring and Control System. Coordinate with the installation on type of lock required for the transformer, to be keyed to the AR1 Post Engineering Specs.

3.8.1. Interior Power

When facility electrical design includes a 480/277V power distribution system, mechanical systems and lighting systems shall generally be fed from the available 480/277V power distribution system.

- 3.8.1.1. Lobby. Provide minimum of 3 power circuits for computer terminals, counter mounted video monitors, multiplex video receiver, tape backup, sound processor for multiple paging sources, music source (such as a CD player) and sound amplifier.
- 3.8.1.2. Provide interior power per the general electrical requirements unless revised by the requirements of this RFP. All electrical outlets shall feature ground-fault circuit-interrupter protection for personnel. Receptacles shall be plainly marked/labeled with the Underwriters Laboratory Federal Specification verification mark (FS-UL). Switches shall be plainly marked to show compliance with Federal Specification W-S-896. Provide a sufficient number of floor and wall electrical outlets to accommodate current needs and potential future growth.
- 3.8.1.3. Electrical equipment (to include lighting) must be damp or wet location listed as applicable. The entire rough water training tank room is considered a wet location.
- 3.8.1.4. In each pool area, provide an electric wall clock visible from the pool deck area.

3.8.2. Interior Lighting

When building electrical design includes 480/277V power distribution system, interior lighting will generally be fed from the 480/277V power distribution system. Pay particular attention to issues such as glare, heat generation, and impact protection for the fixtures in Fitness Facility activity spaces. Provide fluorescent luminaires with electronic programmed start fluorescent ballasts. Provide daylighting dimming systems where dimming is controlled by a photosensor to save energy in interior spaces where on a clear summer day a minimum interior illumination of 50% is expected in the majority of the space and where there is a life cycle cost benefit.

- 3.8.2.1. Lobby. Low profile LED lighting is acceptable under cabinet lighting.
- 3.8.2.2. Provide lighting over the deck only in the pool areas. Luminaires shall not be installed above the pool. Emergency lighting design shall provide illumination of the pools water surface and illumination of the boundary between the pool deck and water. Surface Lighting for the Deep Water Training Tank, the Rough Water Training Tank, and the Multi-Purpose Pool shall provide a minimum of 40 foot-candles of illumination on the deck and pool surface with the pool basin illuminance computed/provided per IESNA RP-6-01 Recommended Practice for Sports and Recreational Area Lighting, paragraph 5.17.2 Illuminance Criteria (Pool Basin). As a minimum, Lap Pool lighting shall be provided per IESNA RP-6-01 Recommended Practice for Sports and Recreational Area Lighting for Class II "Class of Play".
- 3.8.2.3. Lighting fixtures in the pool areas shall be shatterproof.
- 3.8.2.4. Special effects lighting in the Rough Water Training Tank will include large strobe lights, flashing colored lights, and moving lights similar to search lights.

3.8.3. General Site Lighting

Ensure that parking areas and the facility have adequate lighting for safety, evacuation, and security measures. Lighting for all exterior applications shall be controlled by a photosensor and astronomical time switch that is capable of automatically turning off the exterior lighting when sufficient daylight is available or the lighting is not required.

3.8.4. Cathodic Protection System

Corrosion protection for the facility shall be provided by coordinated material specification and/or provision of a cathodic protection system to assure corrosion will not compromise system operation for the 50 year infrastructure design lifetime of the facility. Provide an appropriate Cathodic Protection System when the design analysis of a corrosion engineer indicates cathodic protection is recommended to assure corrosion will not compromise system operation for the 50 year infrastructure design lifetime of the facility.

3.8.5. Mass Notification System (MNS)

Speakers shall be located throughout the facility, providing total coverage. The MNS must be in a separate panel from the Fire Alarm Notification.

3.8.6. PA System

A centrally controlled public address and two-way communication system is required for all pool facilities. At least one public address speaker shall be provided in each locker room, office, check-in, public toilet, and lobby. One indoor speaker shall be provided for every 800 sq. feet of net floor area. The MNS must override the PA. Announcements or music shall be by all-call or by room. Locate the master station at the Control Desk with input for music source. Provide speakers in all habitable spaces. If speakers are mounted on/in a wall, ensure they are mounted at least 8' above the floor.

3.8.7. Individual Room Sound Systems

3.8.7.1 In the Rough Water Training Tank room, CD quality sound for music and sound effects shall be provided. Must be able to handle large bass. Sound effects will involve sounds such as gun fire, bombs exploding, helicopters overhead, voices shouting, and other combat-type sounds. Suspended directional ceiling speakers, 200 watt minimum output rating. The system must be suited for the humid and corrosive environment. Speakers shall be located above the pool deck only.

3.8.7.2. In the Lap Pool/Deep Water Training Tank area, provide a zoned PA system throughout.

3.8.7.3. In the Multi-purpose Pool, CD quality sound for music shall be provided. Suspended directional ceiling speakers, 200 watt minimum output rating. The system must be suited for the humid and corrosive environment. Speakers shall be located above the pool deck only.

3.8.8. Emergency/Accident Alarm

All pool areas shall be provided with an emergency/accident alarm that rings an audible alarm in the pool room as well as notifies the control desk. In addition, the emergency alarm in the Rough Water Training Tank shall automatically shut off the waves, shut off the sound system, turn on the lights, and provide the audible alarm in the room and notification at the control desk.

3.9. TELECOMMUNICATIONS REQUIREMENTS

Design telecommunications design in accordance with the Technical Criteria for Installation Information Infrastructure Architecture (I3A). In the I3A Technical Criteria, substitute the word "shall" for the word "should" throughout the document.

3.9.1. Service

Coordinate service with local NEC (DOIM) personnel.

Install telecommunications/data jacks in accordance with the following requirements:

Green: NIPRNET (unclassified data)

Red: SIPRNET (classified data)

Gray: Voice

3.9.2. System

Provide a fully operational system from the demarcation point to each outlet.

3.9.3. Pool Areas

Ability to dial 911 from each pool area and from the control desk must be provided.

3.10. CABLE TV (CATV) REQUIREMENTS

3.10.1. Service

Cable Television service will be by the Installation provider. The D/B contractor shall provide cabling, conduit, and other required equipment or items to provide service to the communications room from the designated interface point.

3.10.2. System

Provide a CATV system to distribute incoming television signals and user supplied transmissions. Distribution point shall be the communications room. Outlets shall be in the lobby, locker rooms, and training/classroom. Run cables in conduit.

3.11. FIRE ALARM REQUIREMENTS

The fire alarm system shall consist of a fire alarm panel integrated with the MNS, transceiver, initiating devices, and notification devices. The fire alarm system shall be compatible with existing Installation fire alarm system and base MNS, and shall be coordinated with Base Fire Chief and\ or AHJ. The system shall be a Class A, addressable system, Style Z. All audible alarm appliances shall be voice type with a selection of prerecorded announcements.

3.12. CLOSED CIRCUIT TELEVISION

A closed circuit TV system is required to address safety concerns, to monitor authorized access, and for general pool supervision. The system must oversee the lobby and entrances to the pool (to include locker room entrances), and must provide full coverage of the entire pool area.

4.0 APPLICABLE CRITERIA

Unless a specific document version or date is indicated, use criteria from the most current references as of the date of issue of the contract or task order, including any applicable addenda, unless otherwise stated in the task order. In the event of conflict between References and/or Applicable Military Criteria, apply the most stringent requirement, unless otherwise specifically noted in the contract or task order.

4.1. INDUSTRY CRITERIA

Applicable design and construction criteria references are listed in Table 1 below. This list is not intended to include all criteria that may apply or to restrict design and construction to only those references listed. See also Paragraph 3 for additional facility-specific applicable criteria.

Table 1: Industry Criteria

Air Conditioning and Refrigeration Institute (ARI)	
ARI 310/380	Packaged Terminal Air-Conditioners and Heat Pumps
ARI 440	Room Fan-Coil and Unit Ventilator
ANSI/ARI 430-99	Central Station Air Handling Units
ARI 445	Room Air-Induction Units
ARI 880	Air Terminals
Air Movement and Control Association (AMCA)	
AMCA 210	Laboratory Methods of Testing Fans for Rating
American Architectural Manufacturers Association (AAMA)	
AAMA 605	Voluntary Specification Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels
AAMA 607.1	Voluntary Guide Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum
AAMA 1503	Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections
American Association of State Highway and Transportation Officials (AASHTO)	
	Roadside Design Guide [guardrails, roadside safety devices]
	Standard Specifications for Transportation Materials and Methods of Sampling and Testing [Road Construction Materials]

	Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals
	Guide for Design of Pavement Structures, Volumes 1 and 2 [pavement design guide]
	A Policy of Geometric Design of Highways and Streets
American Bearing Manufacturers Association (AFBMA)	
AFBMA Std. 9	Load Ratings and Fatigue Life for Ball Bearings
AFBMA Std. 11	Load Ratings and Fatigue Life for Roller Bearings
American Boiler Manufacturers Association (ABMA)	
ABMA ISEI	Industry Standards and Engineering Information
American Concrete Institute	
ACI 302.2R	Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials
ACI 318	Building Code Requirements for Structural Concrete
ACI SP-66	ACI Detailing Manual
ACI 530	Building Code Requirements for Masonry Structures
ADA Standards for Accessible Design	
See US Access Board	ADA and ABA Accessibility Guidelines for Buildings and Facilities, Chapters 3-10.
American Institute of Steel Construction (AISC)	
	Manual of Steel Construction – 13 th Edition (or latest version)
American Iron and Steel Institute	
AISI S100	North American Specification for the Design of Cold-Formed Steel Structural Members
American National Standards Institute 11 (ANSI)	

ANSI Z21.10.1	Gas Water Heaters Vol. 1, Storage water Heaters with Input Ratings of 75,000 Btu per Hour or less
ANSI Z124.3	American National Standard for Plastic Lavatories
ANSI Z124.6	Plastic Sinks
ANSI Z21.45	Flexible Connectors of Other Than All-Metal Construction for Gas Appliances
ANSI/IEEE C2-2007	National Electrical Safety Code
ANSI/AF&PA NDS-2001	National Design Specification for Wood Construction
American Society of Civil Engineers (ASCE)	
ASCE 7	Minimum Design Loads for Buildings and Other Structures
ASCE 37	Design and Construction of Sanitary and Storm Sewers, Manuals and Reports on Engineering Practice [sanitary sewer and storm drain design criteria]
ASCE/SEI 31-03	Seismic Evaluation of Existing Buildings [Existing Building Alteration/Renovation]
ASCE/SEI 41-06	Seismic Rehabilitation of Existing Buildings [Existing Building Alteration/Renovation]
American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)	
ASHRAE 90.1	ANSI/ASHRAE/IESNA 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings
ASHRAE Guideline 0	The Commissioning Process
ASHRAE Guideline 1.1	The HVAC Commissioning Process
ASHRAE Handbooks	Fundamentals, HVAC Applications, Systems and Equipment, Refrigeration (Applicable, except as otherwise specified)
ASHRAE Standard 15	Safety Standard for Refrigeration Systems
ASHRAE Standard 62.1	Ventilation for Acceptable Indoor Air Quality
ASHRAE Standard 55	Thermal Environmental Conditions for Human Occupancy (Design portion is applicable, except where precluded by other project requirements.)

American Society of Mechanical Engineers International (ASME)	
ASME BPVC SEC VII	Boiler and Pressure Vessel Code: Section VII Recommended Guidelines for the Care of Power Boilers
ASME A17.1	Safety Code for Elevators and Escalators
ASME B 31 (Series)	Piping Codes
American Water Works Association (AWWA)	
	Standards [standards for water line materials and construction]
American Welding Society	
	Welding Handbook
	Welding Codes and Specifications (as applicable to application, see International Building Code for example)
Architectural Woodwork Institute (AWI)	
Version 1.2	AWI Quality Standards 7th Edition
Associated Air Balance Council (AABC)	
AABC MN-1	National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems
	AABC Associated Air Balance Council Testing and Balance Procedures
ASTM International	
ASTM C1060-90(1997)	Standard Practice for Thermographic Inspection of Insulation Installations in Envelope Cavities of Frame Buildings
ASTM E 779 (2003)	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
ASTM E1827-96(2002)	Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door
Builders Hardware Manufacturers Association (BHMA)	
ANSI/BHMA	American National Standards for Builders Hardware

Building Industry Consulting Service International	
	Telecommunications Distribution Methods Manual (TDMM)
	Customer-Owned Outside Plant Design Manual (CO-OSP)
Code of Federal Regulations (CFR)	
49 CFR 192	Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards
10 CFR 430	Energy Conservation Program for Consumer Products
Consumer Electronics Association	
CEA 709.1B	Control Network Protocol Specification
CEA 709.3	Free-Topology Twisted-Pair Channel Specification
CEA 852	Tunneling Component Network Protocols Over Internet Protocol Channels
Electronic Industries Association (EIA)	
ANSI/EIA/TIA 568	Structured Cabling Series
ANSI/EIA/TIA 569	Commercial Building Standard for Telecommunications Pathways and Spaces (includes ADDENDA)
ANSI/TIA/EIA-606	Administrative Standard for the Telecommunications Infrastructure of Commercial Buildings
J-STD EIA/TIA 607	Commercial Building Grounding and Bonding Requirements for Telecommunications
Federal Highway Administration (FHWA)	
	Manual on Uniform Traffic Control Devices for Streets and Highways [signage and pavement markings for streets and highways]
FHWA-NHI-01-021	Hydraulic Engineering Circular No. 22, Second Edition, URBAN DRAINAGE DESIGN MANUAL
Illuminating Engineering Society of North America (IESNA)	
IESNA RP-1	Office Lighting

IESNA RP-8	Roadway Lighting
IESNA Lighting Handbook	Reference and Application
Institute of Electrical and Electronics Engineers Inc. (IEEE)	
	Standard for Use of the International System of Units (SI): the Modern Metric System
Standard 1100	Recommended Practice for Powering and Grounding Sensitive Electronic Equipment
International Code Council (ICC)	
IBC	<p>International Building Code</p> <p>Note: All references in the International Building Code to the International Electrical Code shall be considered to be references to NFPA 70.</p> <p>All references in the International Building Code to the International Fuel Gas Code shall be considered to be references to NFPA 54 and NFPA 58.</p> <p>All references in the International Building Code to the International Fire Code and Chapter 9 shall be considered to be references to Unified Facilities Criteria (UFC) 3-600-01.</p>
IMC	<p>International Mechanical Code –</p> <p>Note: For all references to “HEATING AND COOLING LOAD CALCULATIONS”, follow ASHRAE 90.1</p> <p>Note: For all references to “VENTILATION”, follow ASHRAE 62.1</p>
IRC	International Residential Code
IPC	International Plumbing Code
IEC	Energy Conservation Code (IEC) –Applicable only to the extent specifically referenced herein. Refer to Paragraph 5, ENERGY CONSERVATION requirements.
IGC	International Gas Code - not applicable. Follow NFPA 54, National Fuel Gas Code and NFPA 58, Liquefied Petroleum Gas Code.
International Organization for Standardization (ISO)	
ISO 6781:1983	Qualitative detection of thermal irregularities in building envelopes –

	infrared method
LonMark International (LonMark)	
LonMark Interoperability Guidelines	(available at www.lonmark.org), including: Application Layer Guidelines, Layer 1-6 Guidelines, and External Interface File (XIF) Reference Guide
LonMark Resource Files	(available at www.lonmark.org), including Standard Network Variable Type (SNVT) definitions
Metal Building Manufacturers Association (MBMA)	
	Metal Building Systems Manual
Midwest Insulation Contractors Association (MICA)	
	National Commercial and Industrial Insulation Standards Manual
National Association of Corrosion Engineers International (NACE)	
NACE RP0169	Control of External Corrosion on Underground or Submerged Metallic Piping Systems
NACE RP0185	Extruded, Polyolefin Resin Coating Systems with Adhesives for Underground or Submerged Pipe
NACE RP0285	Corrosion Control of Underground Storage Tank Systems by Cathodic Protection
NACE RP0286	Electrical Isolation of Cathodically Protected Pipelines
National Electrical Manufacturers Association (NEMA)	
National Environmental Balancing Bureau (NEBB)	
	Procedural Standards Procedural Standards for Testing Adjusting Balancing of Environmental Systems
National Fire Protection Association (NFPA)	
NFPA 10	Standard for Portable Fire Extinguishers
NFPA 13	Installation of Sprinkler Systems
NFPA 13R	Residential Occupancies up to and Including Four Stories in Height Sprinkler Systems

NFPA 14	Standard for the Installation of Standpipes and Hose Systems
NFPA 20	Installation of Centrifugal Fire Pumps
NFPA 24 NFPA 25	Standard for the Installation of Private Fire Service Mains and Their Appurtenances [underground fire protection system design] Inspection, Testing And Maintenance Of Water-Based Fire Protection Systems
NFPA 30	Flammable and Combustible Liquids Code
NFPA 30A	Motor Fuel Dispensing Facilities and Repair Garages
NFPA 31	Installation of Oil Burning Equipment
NFPA 54	National Fuel Gas Code
NFPA 58	Liquefied Petroleum Gas Code
NFPA 70	National Electrical Code
NFPA 72	National Fire Alarm Code
NFPA 76	Fire Protection of Telecommunications Facilities
NFPA 80	Standard for Fire Doors and Fire Windows
NFPA 90a	Installation of Air Conditioning and Ventilating Systems
NFPA 96	Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations
NFPA 101	Life Safety Code
NFPA 780	Standard for the Installation of Lightning Protection Systems
National Roofing Contractor's Association (NRCA)	
	Roofing and Waterproofing Manual
National Sanitation Foundation, International	
NSF/ANSI Std. 2, 3, 4, 5, 6, 7, 8, 12, 13, 18, 20, 21, 25, 29, 35, 36, 37, 51, 52, 59,	Food Equipment Standards

169	
ANSI/UL Std. 73, 197, 471, 621, 763	Food Equipment Standards
CSA Std. C22.2 No. 109, 120, 195	Food Equipment Standards
Occupational Safety and Health Administration (OSHA)	
Title 29, Part 1926	OSHA Construction Industry Standards, Title 29, Code of Federal Regulations, Part 1926, Safety and Health Regulations for Construction
Plumbing and Drainage Institute (PDI)	
PDI G 101	Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data
PDI WH201	Water Hammer Arrestors
Precast Concrete Institute	
PCI Design Handbook	Precast and Prestressed Concrete
Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)	
SMACNA HVAC Duct Construction Standards	HVAC Duct Construction Standards - Metal and Flexible
SMACNA Architectural Manual	Architectural Sheet Metal Manual
SMACNA HVAC TAB	HVAC Systems - Testing, Adjusting and Balancing
State/Local Regulations	
	State Department of Transportation Standard Specifications for Highway and Bridge Construction
	Sedimentation and Erosion Control Design Requirements
	Environmental Control Requirements
	Storm Water Management Requirements
Steel Door Institute (SDI)	

ANSI A250.8/SDI 100	Standard Steel Doors and Frames
Steel Deck Institute	
	SDI Diaphragm Design Manual
Steel Joist Institute	
	Catalog of Standard Specifications and Load Tables for Steel Joists and Joist Girders
Underwriters Laboratories (UL)	
UL 96A	Installation Requirements for Lightning Protection Systems
UL 300	Standard for Safety for Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Areas
UNITED STATES ACCESS BOARD: U.S. ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD	
ADA and ABA Accessibility Guidelines for Buildings and Facilities	<p>ABA Accessibility Standard for DoD Facilities</p> <p>Derived from the ADA and ABA Accessibility Guidelines: Specifically includes: ABA Chapters 1 and 2 and Chapters 3 through 10.</p> <p>Use this reference in lieu of IBC Chapter 11.</p> <p>Excluded are:</p> <p>(a) Facilities, or portions of facilities, on a military installation that are designed and constructed for use exclusively by able-bodied military personnel (See Paragraph 3 for any reference to this exclusion).</p> <p>(b) Reserve and National Guard facilities, or portions of such facilities, owned by or under the control of the Department of Defense, that are designed and constructed for use exclusively by able-bodied military personnel. (See paragraph 3 for any reference to this exclusion).</p>
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES	
	FDA National Food Code
U.S. GREEN BUILDING COUNCIL (USGBC)	
LEED-NC	Green Building Rating System for New Construction & Major Renovations
	Application Guide for Multiple Buildings and On-Campus Building Projects

4.2. MILITARY CRITERIA

The project shall conform to the following criteria. Certain design impacts and features due to these criteria are noted for the benefit of the offeror. However, all requirements of the referenced criteria will be applicable, whether noted or not, unless otherwise specified herein.

4.2.1. Energy Policy Act of 2005 (Public Law 109-58) (applies only to the extent specifically implemented in the contract, which may or may not directly cite or reference EPACT)

4.2.2. Executive Order 12770: Metric Usage In Federal Government

(a) Metric design and construction is required except when it increases construction cost. Offeror to determine most cost efficient system of measurement to be used for the project.

4.2.3. TB MED 530: Occupational and Environmental Health Food Sanitation

4.2.4. Unified Facilities Criteria (UFC) 3-410-01FA: Heating, Ventilating, and Air Conditioning - applicable only to the extent specified in paragraph 5, herein.

4.2.5. Deleted.

4.2.6. UFC 3-600-01 Design: Fire Protection Engineering for Facilities. Use the latest edition of the IBC in coordination with this UFC. Use Chapters 3, 6, 7, 33 and UFC 3-600-01. If any conflict occurs between these Chapters and UFC 3-600-01, the requirements of UFC 3-600-01 take precedence. Use UFC 3-600-01 in lieu of IBC Chapters 4, 8,9,10.

4.2.7. UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings

4.2.8. UFC 4-023-03 Design of Buildings to Resist Progressive Collapse (Use most recent version, regardless of references thereto in other publications)

(a) Note the option to use tie force method or alternate path design for Occupancy Category II.

4.2.9. UFC 4-021-01 Design and O&M: Mass Notification Systems

4.2.10. Technical Criteria for Installation Information Infrastructure Architecture (I3A)

(a) Email: DetrickISECI3Aguide@conus.army.mil

4.2.11. U.S. Army Information Systems Engineering Command (USAISEC) TG for the Integration of SECRET Internet Protocol (IP) Router Network (SIPRNET). See Paragraph 3 for applicability to specific facility type. May not apply to every facility. This is mandatory criteria for those facilities with SIPRNET.

5.0 GENERAL TECHNICAL REQUIREMENTS

This paragraph contains technical requirements with general applicability to Army facilities. See also Paragraph 3 for facility type-specific operational, functional and technical requirements. Residential or similar grade finishes and materials are not acceptable for inclusion in these buildings, unless otherwise specifically allowed.

5.1. SITE PLANNING AND DESIGN

5.1.1. STANDARDS AND CODES: The site planning and design shall conform to APPLICABLE CRITERIA and to paragraph 6, PROJECT SPECIFIC REQUIREMENTS.

5.1.2. SITE PLANNING OBJECTIVES: Group buildings in configurations that create a sense of community and promote pedestrian use. See paragraph 3 for additional site planning requirements relating to building functions.

5.1.2.1. Provide enclosures and or visual screening devices for Outdoor Utility such as dumpsters, emergency generators, transformers, heating, ventilation, and air conditioning units from streetscape and courtyard views to limit visual impact. Enclosures shall be compatible with the building they serve and accessible by vehicle. The location of dumpsters can have a significant visual impact and should be addressed as part of an overall building design and incorporated in site planning.

5.1.2.2. Where included in the project, dumpster pads shall be concrete (minimum of 8 inches thick on 4 inch base course, unless site conditions dictate more conservative requirements) and directly accessible by way of a paved service drive or parking lot with adequate overhead clearance for collection vehicles. Provide space at dumpster areas for recycling receptacles. Coordinate with Installation on recycling receptacle types, sizes and access requirements and provide space at dumpster areas to accommodate them.

5.1.2.3. Vehicular Circulation. Apply design vehicle templates provided by the American Association of State Highway and Transportation Officials (AASHTO) to the site design. The passenger car class includes passenger cars and light trucks, such as vans and pick-ups. The passenger car template is equivalent to the non-organizational – privately owned vehicle (POV). The truck class template includes single-unit trucks, recreation vehicles, buses, truck tractor-semi-trailer combinations, and trucks or truck tractors with semi-trailers in combination with full trailers. Provide vehicle clearances required to meet traffic safety for emergency vehicles, service vehicles, and moving vans. Provide required traffic control signage Site entrances and site drive aisles shall maximize spacing between drives, incorporate right-angle turns, and limit points of conflict between traffic. Design Services Drives to restrict access to unauthorized vehicles by removable bollards, gates, or other barriers to meet Anti-Terrorism/Force Protection (ATFP) requirements. Orient service drives to building entrances other than the primary pedestrian entry at the front of the building.

5.1.2.4. Provide Emergency Vehicle Access around the facility and shall be in accordance with AT/FP requirements. Maintain a 33-foot clear zone buffer for emergency vehicles, designed to prevent other vehicles from entering the AT/FP standoff to the building.

5.1.2.5. Clear and grub all trees and vegetation necessary for construction; but, save as many trees as possible. Protect trees to be saved during the construction process from equipment.

5.1.2.6. Stormwater Management. Employ design and construction strategies (Best Management Practices) that reduce stormwater runoff, reduce discharges of polluted water offsite and maintain or restore predevelopment hydrology with respect to temperature, rate, volume and duration of flow to the maximum extent practicable. See paragraph 6, PROJECT SPECIFIC requirements for additional information.

5.1.3. EXTERIOR SIGNAGE: Provide exterior signage in accordance with Appendix H, Exterior Signage. Provide exterior NO SMOKING signage that conveys building and grounds smoking policy.

5.1.4. EXISTING UTILITIES: Base utilities maps and capacities for this site are included as part of this RFP. See paragraph 6 for more detailed information.

5.2. SITE ENGINEERING

5.2.1. STANDARDS AND CODES: The site engineering shall conform to APPLICABLE CRITERIA.

5.2.2. SOILS:

5.2.2.1. A report has been prepared to characterize the subsurface conditions at the project site and is **appended to these specifications**. The report provides a general overview of the soil and geologic conditions with detailed descriptions at discrete boring locations. The Contractor's team shall include a licensed geotechnical engineer to interpret the report and develop earthwork and foundation recommendations and design parameters in which to base the contractor's design. If any additional subsurface investigation or laboratory analysis is required to better characterize the site or develop the final design, the Contractor shall perform it under the direction of a licensed geotechnical engineer. There will be no separate payment for the cost of additional tests. If differences between the Contractor's additional subsurface investigation and the government provided soils report or the reasonably expected conditions require material revisions in the design, an equitable adjustment may be made, in accordance with the provisions of the Differing Site Conditions clause. The basis for the adjustment would be the design and construction appropriate for the conditions described in the Government furnished report or the reasonably expected conditions, in comparison with any changes required by material differences in the actual conditions encountered, in accordance with the terms of contract clause Differing Site Conditions.

5.2.2.2. The contractor's licensed geotechnical engineer shall prepare a final geotechnical evaluation report, to be submitted along with the first foundation design submittal, as described in Section 01 33 16, *Design After Award*.

5.2.3. VEHICLE PAVEMENTS: (as applicable to the project)

5.2.3.1. Design procedures and materials shall conform to one of the following: 1) the USACE Pavement Transportation Computer Assisted Structural Engineering (PCASE) program, 2) American Association of State Highway and Transportation Officials (AASHTO) or, 3) the applicable state Department of Transportation standards in which the project is located. See paragraph 5.2.2.2 and Section 01 33 16 for required information for the Contractor's geotechnical evaluation report. The minimum flexible pavement section shall consist of 2 inches of asphalt and 6 inches of base or as required by the pavement design, whichever is greater, unless specifically identified by the Government to be a gravel road. Design roads and parking areas for a life expectancy of 25 years with normal maintenance. Parking area for tactical vehicles (as applicable to the project) shall be Portland Cement Concrete (PCC) rigid pavement design. For concrete pavements, submit joint layout plan for review and concurrence. Design pavements for military tracked vehicles (as applicable to the project) IAW USACE PCASE. Traffic estimates for each roadway area will be as shown on the drawings or listed in Section 01 10 00 Paragraph 6.4.4. Pavement markings and traffic signage shall comply with the Installation requirements and with the Manual on Uniform Traffic Control Devices.

5.2.3.2. Parking Requirements.

- (a) All handicap POV parking lots (where applicable in the facility specific requirements) shall meet the ADA and ABA Accessibility Guidelines for accessible parking spaces.
- (b) Design POV parking spaces for the type of vehicles anticipated, but shall be a minimum of 9 ft by 18 ft for POVs, except for two wheel vehicles.

5.2.3.3. Sidewalks. Design the network of walks throughout the complex (where applicable) to facilitate pedestrian traffic among facilities, and minimize the need to use vehicles. Incorporate sidewalks to enhance the appearance of the site development, while creating a sense of entry at the primary patron entrances to the buildings. Minimum sidewalk requirements are in Paragraph 3, where applicable and/or paragraph 6 and/or site plans, where applicable..

5.2.4. CATHODIC PROTECTION: Provide cathodic protection systems for all underground metallic systems and metallic fittings/portions of non-metallic, underground systems, both inside and outside the building 5 foot line that are subject to corrosion. Coordinate final solutions with the installation to insure an approach that is consistent with installation cathodic protection programs.

5.2.5. UTILITIES: See paragraph 6.4.6 for specific information on ownership of utilities and utility requirements. Meter all utilities (gas, water, and electric, as applicable) to each facility. For Government owned utilities, install meters that are wireless data transmission capable as well as have a continuous manual reading option. All meters will be capable of at least hourly data logging and transmission and provide consumption data for gas, water, and

electricity. Gas and electric meters will also provide demand readings based on consumption over a maximum of any 15 minute period. Configure all meters to transmit at least daily even if no receiver for the data is currently available at the time of project acceptance. For privatized utilities, coordinate with the privatization utility(ies) for the proper meter base and meter installation.

5.2.6. PERMITS: The CONTRACTOR shall be responsible for obtaining all permits (local, state and federal) required for design and construction of all site features and utilities.

5.2.7. IRRIGATION. Landscape irrigation systems, if provided, shall comply with the following:

5.2.7.1. Irrigation Potable Water Use Reduction. Reduce irrigation potable water use by 100 percent using LEED credit WE1.1 baseline (no potable water used for irrigation), except where precluded by other project requirements.

5.2.8. EPA WaterSense Products and Contractors. Except where precluded by other project requirements, use EPA WaterSense labeled products and irrigation contractors that are certified through a WaterSense labeled program where available.

5.3. ARCHITECTURE AND INTERIOR DESIGN:

This element will be evaluated per APPLICABLE CRITERIA under the quality focus.

5.3.1. STANDARDS AND CODES: The architecture and interior design shall conform to APPLICABLE CRITERIA.

5.3.2. GENERAL: Overall architectural goal is to provide a functional, quality, visually appealing facility that is a source of pride for the installation and delivered within the available budget and schedule.

5.3.3. COMPUTATION OF AREAS: See APPENDIX Q for how to compute gross and net areas of the facility(ies).

5.3.4. BUILDING EXTERIOR: Design buildings to enhance or compliment the visual environment of the Installation. Where appropriate, reflect a human scale to the facility. Building entrance should be architecturally defined and easily seen. When practical, exterior materials, roof forms, and detailing shall be compatible with the surrounding development and adjacent buildings on the Installation and follow locally established architectural themes. Use durable materials that are easy to maintain. Exterior colors shall conform to the Installation requirements. See paragraph 6.

5.3.4.1. Building Numbers: Permanently attach exterior signage on two faces of each building indicating the assigned building number or address. Building number signage details and locations shall conform to Appendix H, Exterior Signage.

5.3.5. BUILDING INTERIOR

5.3.5.1. Space Configuration: Arrange spaces in an efficient and functional manner in accordance with area adjacency matrices.

5.3.5.2. Surfaces: Appearance retention is the top priority for building and furniture related finishes. Provide low maintenance, easily cleaned room finishes that are commercially standard for the facility occupancy specified, unless noted otherwise.

5.3.5.3. Color: The color, texture and pattern selections for the finishes of the building shall provide an aesthetically pleasing, comfortable, easily maintainable and functional environment for the occupants. Coordinate the building colors and finishes for a cohesive design. Select colors appropriate for the building type. Use color, texture and pattern to path or way find through the building. Trendy colors that will become dated shall be limited to non-permanent finishes such as carpet and paint. Select finishes with regards to aesthetics, maintenance, durability, life safety and image. Limit the number of similar colors for each material. Use medium range colors for ceramic and porcelain tile grout to help hide soiling. Plastic laminate and solid surface materials shall have patterns that are mottled, flecked or speckled. Coordinate finish colors of fire extinguisher cabinets, receptacle bodies and plates, fire alarms / warning lights, emergency lighting, and other miscellaneous items with the building interior. Match color of equipment items on ceilings (speakers, smoke detectors, grills, etc.) the ceiling color.

5.3.5.4. Circulation: Circulation schemes must support easy way finding within the building.

5.3.5.5. Signage: Provide interior signage for overall way finding and life safety requirements. A comprehensive interior plan shall be from one manufacturer. Include the following sign types: (1) Lobby Directory, (2) Directional Signs; (3) Room Identification Signs; (4) Building Service Signs; (5) Regulatory Signs; (6) Official and Unofficial Signs (7) Visual Communication Boards (8) NO SMOKING signage that conveys building smoking policy. Use of emblems or logos may also be incorporated into the signage plan.

5.3.5.6. Window Treatment: Provide interior window treatments with adjustable control in all exterior window locations for control of day light coming in windows or privacy at night. Maintain uniformity of treatment color and material to the maximum extent possible within a building.

5.3.6. COMPREHENSIVE INTERIOR DESIGN

5.3.6.1. Comprehensive Interior Design includes the integration of a Structural Interior Design (SID) and a Furniture, Fixtures and Equipment (FF&E) design and package. SID requires the design, selection and coordination of interior finish materials that are integral to or attached to the building structure. Completion of a SID involves the selection and specification of applied finishes for the building's interior features including, but not limited to, walls, floors, ceilings, trims, doors, windows, window treatments, built-in furnishings and installed equipment, lighting, and signage. The SID package includes finish schedules, finish samples and any supporting interior elevations, details or plans necessary to communicate the building finish design and build out. The SID also provides basic space planning for the anticipated FF&E requirements in conjunction with the functional layout of the building and design issues such as life safety, privacy, acoustics, lighting, ventilation, and accessibility. See Section 01 33 16 for SID design procedures.

5.3.6.2. The FF&E design and package includes the design, selection, color coordination and of the required furnishing items necessary to meet the functional, operational, sustainability, and aesthetic needs of the facility coordinated with the interior finish materials in the SID. The FF&E package includes the specification, procurement documentation, placement plans, ordering and finish information on all freestanding furnishings and accessories, and a cost estimate. Coordinate the selection of furniture style, function and configuration with the defined requirements. Examples of FF&E items include, but are not limited to workstations, seating, files, tables, beds, wardrobes, draperies and accessories as well as marker boards, tack boards, and presentation screens. Criteria for furniture selection include function and ergonomics, maintenance, durability, sustainability, comfort and cost. See Section 01 33 16 for FFE design procedures.

5.4. STRUCTURAL DESIGN

5.4.1. STANDARDS AND CODES: The structural design shall conform to APPLICABLE CRITERIA.

5.4.2. GENERAL: The structural system must be compatible with the intended functions and components that allows for future flexibility and reconfigurations of the interior space. Do not locate columns, for instance, in rooms requiring visibility, circulation or open space, including, but not limited to entries, hallways, common areas, classrooms, etc. Select an economical structural system based upon facility size, projected load requirements and local availability of materials and labor. Base the structural design on accurate, site specific geotechnical information and anticipated loads for the building types and geographical location. Consider climate conditions, high humidity, industrial atmosphere, saltwater exposure, or other adverse conditions when selecting the type of cement and admixtures used in concrete, the concrete cover on reinforcing steel, the coatings on structural members, expansion joints, the level of corrosion protection, and the structural systems. Analyze, design and detail each building as a complete structural system. Design structural elements to preclude damage to finishes, partitions and other frangible, non-structural elements to prevent impaired operability of moveable components; and to prevent cladding leakage and roof ponding. Limit deflections of structural members to the allowable of the applicable material standard, e.g., ACI, AISC, Brick Industry Association, etc. When modular units or other pre-fabricated construction is used or combined with stick-built construction, fully coordinate and integrate the overall structural design between the two different or interfacing construction types. If the state that the project is located in requires separate, specific licensing for structural engineers (for instance, such as in Florida, California and others), then the structural engineer designer of record must be registered in that state.

5.4.3. LOADS: See paragraph 3 for facility specific (if applicable) and paragraph 6 for site and project specific structural loading criteria. Unless otherwise specified in paragraph 6, use Exposure Category C for wind. If not

specified, use Category C unless the Designer of Record can satisfactorily justify another Exposure Category in its design analysis based on the facility Master Plan. Submit such exceptions for approval as early as possible and prior to the Interim Design Submittal in Section "Design After Award". Design the ancillary building items, e.g. doors, window jambs and connections, overhead architectural features, systems and equipment bracing, ducting, piping, etc. for gravity, seismic, lateral loads and for the requirements of UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings. Ensure and document that the design of glazed items includes, but is not limited to, the following items under the design loads prescribed in UFC 4-010-01:

- (a) Supporting members of glazed elements, e.g. window jamb, sill, header
- (b) Connections of glazed element to supporting members, e.g. window to header
- (c) Connections of supporting members to each other, e.g. header to jamb
- (d) Connections of supporting members to structural system, e.g. jamb to foundation.

5.4.4. TERMITE TREATMENT: (Except Alaska) Provide termite prevention treatment in accordance with Installation and local building code requirements, using licensed chemicals and licensed applicator firm.

5.5. THERMAL PERFORMANCE

5.5.1. STANDARDS AND CODES: Building construction and thermal insulation for mechanical systems shall conform to APPLICABLE CRITERIA.

5.5.2. BUILDING ENVELOPE SEALING PERFORMANCE REQUIREMENT. Design and construct the building envelope for office buildings, office portions of mixed office and open space (e.g., company operations facilities), dining, barracks and instructional/training facilities with a continuous air barrier to control air leakage into, or out of, the conditioned space. Clearly identify all air barrier components of each envelope assembly on construction documents and detail the joints, interconnections and penetrations of the air barrier components. Clearly identify the boundary limits of the building air barriers, and of the zone or zones to be tested for building air tightness on the drawings. Pending the publication of the 2010 version of ASHRAE 90.1, the use of painted interior walls is not an acceptable air barrier method.

5.5.2.1. Trace a continuous plane of air-tightness throughout the building envelope and make flexible and seal all moving joints.

5.5.2.2. The air barrier material(s) must have an air permeance not to exceed 0.004 cfm / sf at 0.3" wg (0.02 L/s.m2 @ 75 Pa) when tested in accordance with ASTM E 2178

5.5.2.3. Join and seal the air barrier material of each assembly in a flexible manner to the air barrier material of adjacent assemblies, allowing for the relative movement of these assemblies and components.

5.5.2.4. Support the air barrier so as to withstand the maximum positive and negative air pressure to be placed on the building without displacement, or damage, and transfer the load to the structure.

5.5.2.5. Seal all penetrations of the air barrier. If any unavoidable penetrations of the air barrier by electrical boxes, plumbing fixture boxes, and other assemblies are not airtight, make them airtight by sealing the assembly and the interface between the assembly and the air barrier or by extending the air barrier over the assembly.

5.5.2.6. The air barrier must be durable to last the anticipated service life of the assembly.

5.5.2.7. Do not install lighting fixtures with ventilation holes through the air barrier

5.5.2.8. Provide a motorized damper in the closed position and connected to the fire alarm system to open on call and fail in the open position for any fixed open louvers such as at elevator shafts.

5.5.2.9. Damper and control to close all ventilation or make-up air intakes and exhausts, atrium smoke exhausts and intakes, etc when leakage can occur during inactive periods.

5.5.2.10. Compartmentalize garages under buildings by providing air-tight vestibules at building access points.

5.5.2.11. Compartmentalize spaces under negative pressure such as boiler rooms and provide make-up air for combustion.

5.5.2.12. Performance Criteria and Substantiation: Submit the qualifications and experience of the testing entity for approval. Demonstrate performance of the continuous air barrier for the opaque building envelope by the following tests:

(a) Test the completed building and demonstrate that the air leakage rate of the building envelope does not exceed 0.25cfm/ft² at a pressure differential of 0.3" w.g.(75 Pa) in accordance with ASTM's E 779 (2003) or E-1827-96 (2002). Accomplish tests using either pressurization or depressurization or both. Divide the volume of air leakage in cfm @ 0.3" w.g. (L/s @ 75 Pa) by the area of the pressure boundary of the building, including roof or ceiling, walls and floor to produce the air leakage rate in cfm/ft² @ 0.3" w.g. (L/s.m² @ 75 Pa). Do not test the building until verifying that the continuous air barrier is in place and installed without failures in accordance with installation instructions so that repairs to the continuous air barrier, if needed to comply with the required air leakage rate, can be done in a timely manner.

(b) Test the completed building using Infrared Thermography testing. Use infrared cameras with a resolution of 0.1deg C or better. Perform testing on the building envelope in accordance with ISO 6781:1983 and ASTM C1060-90(1997). Determine air leakage pathways using ASTM E 1186-03 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems, and perform corrective work as necessary to achieve the whole building air leakage rate specified in (a) above.

(c) Notify the Government at least three working days prior to the tests to provide the Government the opportunity to witness the tests. Provide the Government written test results confirming the results of all tests.

5.6. PLUMBING

5.6.1. STANDARDS AND CODES: The plumbing system shall conform to APPLICABLE CRITERIA.

5.6.2. PRECAUTIONS FOR EXPANSIVE SOILS: Where expansive soils are present, include design features for underslab piping systems and underground piping serving chillers, cooling towers, etc, to control forces resulting from soil heave. Some possible solutions include, but are not necessarily limited to, features such as flexible expansion joints, slip joints, horizontal offsets with ball joints, or multiple bell and spigot gasketed fittings. For structurally supported slabs, suspend piping from the structure with adequate space provided below the pipe for the anticipated soil movement.

5.6.3. HOT WATER SYSTEMS: For Hot Water heating and supply, provide a minimum temp of 140 Deg F in the storage tank and a maximum of 110 Deg F at the fixture, unless specific appliances or equipment specifically require higher temperature water supply.

5.6.4. SIZING HOT WATER SYSTEMS: Unless otherwise specified or directed in paragraph 3, design in accordance with ASHRAE Handbook Series (appropriate Chapters), ASHRAE Standard 90.1, and the energy conservation requirements of the contract. Size and place equipment so that it is easily accessible and removable for repair or replacement.

5.6.5. JANITOR CLOSETS: In janitor spaces/room/closets, provide at minimum, a service sink with heavy duty shelf and wall hung mop and broom rack(s).

5.6.6. FLOOR DRAINS: As a minimum, provide floor drains in mechanical rooms and areas, janitor spaces/rooms/closets and any other area that requires drainage from fixtures or equipment, drain downs, condensate, as necessary.

5.6.7. URINALS: Urinals shall be vitreous china, wall-mounted, wall outlet, non-water using, with integral drain line connection, and with sealed replaceable cartridge or integral liquid seal trap. Either type shall use a biodegradable liquid to provide the seal and maintain a sanitary and odor-free environment. Install, test and maintain in accordance with manufacturer's recommendations. Slope the sanitary sewer branch line for non-water use urinals a minimum of 1/4 inch per foot. Do not use copper tube or pipe for drain lines that connect to the urinal. Manufacturer shall provide an operating manual and on-site training to installation operations personnel for the proper care and maintenance of the urinal. For complexes, non-water using urinals are not required for barracks type spaces.

5.6.8. BUILDING WATER USE REDUCTION. Reduce building potable water use in each building 30 percent using IPC fixture performance requirements baseline.

5.6.9. Do not use engineered vent or Sovent® type drainage systems.

5.6.10. Where the seasonal design temperature of the cold water entering a building is below the seasonal design dew point of the indoor ambient air, and where condensate drip will cause damage or create a hazard, insulate plumbing piping with a vapor barrier type of insulation to prevent condensation. Do not locate water or drainage piping over electrical wiring or equipment unless adequate protection against water (including condensation) damage is provided. Insulation alone is not adequate protection against condensation. Follow ASHRAE Fundamentals Chapter 23, Insulation for Mechanical Systems, IMC paragraph 1107 and International Energy Conservation Code for pipe insulation requirements.

5.7. ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

5.7.1. STANDARDS AND CODES: The electrical systems for all facilities shall conform to APPLICABLE CRITERIA.

5.7.2. MATERIALS AND EQUIPMENT: Materials, equipment and devices shall, as a minimum, meet the requirements of Underwriters Laboratories (UL) where UL standards are established for those items. Wiring for branch circuits shall be copper. Motors larger than one-half horsepower shall be three phase. All electrical systems shall be pre-wired and fully operational unless otherwise indicated. Wall mounted electrical devices (power receptacles, communication outlets and CATV outlets) shall have matching colors, mounting heights and faceplates.

5.7.3. POWER SERVICE: Primary service from the base electrical distribution system to the pad-mounted transformer and secondary service from the transformer to the building service electrical equipment room shall be underground. See paragraph 6 for additional site electrical requirements.

5.7.3.1. Spare Capacity: Provide 10% space for future circuit breakers in all panelboards serving residential areas of buildings and 15% spaces in all other panelboards.

5.7.4. TELECOMMUNICATION SERVICE: Connect the project's facilities to the Installation telecommunications (voice and data) system through the outside plant (OSP) telecommunications underground infrastructure cabling system per the I3A Criteria. Connect to the OSP cabling system from each facility main cross connect located in the telecommunications room.

5.7.5. LIGHTING: Comply with the recommendations of the Illumination Engineering Society of North America (IESNA), the National Energy Policy Act and Energy Star requirements for lighting products..

5.7.5.1. Interior Lighting:

(a) Reflective Surfaces: Coordinate interior architectural space surfaces and colors with the lighting systems to provide the most energy-efficient workable combinations.

(b) High Efficiency Fluorescent Lighting: Utilize NEMA premium electronic ballasts and energy efficient fluorescent lamps with a Correlated Color Temperature (CCT) of 4100K. Linear fluorescent and compact fluorescent fixtures shall have a Color Rendering Index of (CRI) of 87 or higher. Fluorescent lamps shall be the low mercury type qualifying as non-hazardous waste upon disposal. Do not use surface mounted fixtures on acoustical tile ceilings. Provide an un-switched fixture with emergency ballast shall be provided at each entrance to the building.

(c) Solid State Lighting: Fixtures shall provide lighting with a minimum Correlated Color Temperature (CCT) of 4100K and shall have a Color Rendering Index of (CRI) of 75 or higher. Verify performance of the light producing solid state components by a test report in compliance with the requirements of IESNA LM 80. Verify performance of the solid state light fixtures by a test report in compliance with the requirements of IESNA LM 79. Provide lab results by a NVLAP certified laboratory. The light producing solid state components and drivers shall have a life expectancy of 50,000 operating hours while maintaining at least 70% of original illumination level. Provide a complete five year warranty for fixtures.

(d) Metal Halide Lighting (where applicable): Metal Halide lamp fixtures in the range of 150-500 Watts shall be pulse start type and have a minimum efficiency rating of 88%.

(e) Lighting Controls: ANSI/ASHRAE/IESNA 90.1 has specific lighting controls requirements. Provide a high level of lighting system control by individual occupants or by specific groups in multi-occupant spaces (classrooms, conference rooms) to promote the productivity, comfort and well being of the building occupants. In office spaces, the preferred lighting should be a 30 FC ambient lighting level with occupancy sensor controlled task lighting in the work spaces to provide a composite lighting level of 50 FC on the working surfaces. Consider incorporating daylighting techniques for the benefit of reducing lighting energy requirements while improving the quality of the indoor spaces. If daylight strategies are used, additional coordination is required with the architect and mechanical engineer. Additionally, incorporate electric lighting controls to take advantage of the potential energy savings.

(f) Exterior Lighting: See paragraph 6.9 for site specific information, if any, on exterior lighting systems. Minimize light pollution and light trespass by not over lighting and use cut-off type exterior luminaires.

5.7.6. TELECOMMUNICATION SYSTEM: Building telecommunications cabling systems (BCS) and OSP telecommunications cabling system shall conform to APPLICABLE CRITERIA, including but not limited to I3A Technical Criteria. An acceptable BCS encompasses, but is not limited to, copper and fiber optic (FO) entrance cable, termination equipment, copper and fiber backbone cable, copper and fiber horizontal distribution cable, workstation outlets, racks, cable management, patch panels, cable tray, cable ladder, conduits, grounding, and labeling.. Items included under OSP infrastructure encompass, but are not limited to, manhole and duct infrastructure, copper cable, fiber optic cable, cross connects, terminations, cable vaults, and copper and FO entrance cable.

5.7.6.1. Design, install, label and test all telecommunications systems in accordance with the I3A Criteria and ANSI/TIA/EIA 568, 569, and 606 standards. A Building Industry Consulting Services International (BICSI) Registered Communications Distribution Designer (RCDD) with at least 2 yrs related experience shall develop and stamp telecommunications design, and prepare the test plan. See paragraph 5.8.2.5 for design of environmental systems for Telecommunications Rooms.

5.7.6.2. The installers assigned to the installation of the telecommunications system or any of its components shall be regularly and professionally engaged in the business of the application, installation and testing of the specified telecommunications systems and equipment. Key personnel; i.e., supervisors and lead installers assigned to the installation of this system or any of its components shall be BICSI Registered Cabling Installers, Technician Level. Submit documentation of current BICSI certification for each of the key personnel. In lieu of BICSI certification, supervisors and installers shall have a minimum of 5 years experience in the installation of the specified copper and fiber optic cable and components. They shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products.

5.7.6.3. Perform a comprehensive end to end test of all circuits to include all copper and fiber optic cables upon completion of the BCS and prior to acceptance of the facility. Provide adequate advanced notification to the COR to allow COR and Installation personnel attendance. The BCS circuits include but are not limited to all copper and fiber optic(FO) entrance cables, termination equipment, copper and fiber backbone cable, copper and fiber horizontal distribution cable, and workstation outlets. Test in accordance with ANSI/EIA/TIA 568 standards. Use test instrumentation that meets or exceeds the standard. Submit the official test report to include test procedures, parameters tested, values, discrepancies and corrective actions in electronic format. Test and accomplish all necessary corrective actions to ensure that the government receives a fully operational, standards based, code compliant telecommunications system.

5.7.7. LIGHTNING PROTECTION SYSTEM: Provide a lightning protection system where recommended by the Lightning Risk Assessment of NFPA 780, Annex L.

5.8. HEATING, VENTILATING, AND AIR CONDITIONING

5.8.1. STANDARDS AND CODES: The HVAC system shall conform to APPLICABLE CRITERIA.

5.8.2. DESIGN CONDITIONS.

5.8.2.1. Outdoor and indoor design conditions shall be in accordance with UFC 3-410-01FA. Outdoor air and exhaust ventilation requirements for indoor air quality shall be in accordance with ASHRAE 62.1. All Buildings with

minimum LEED Silver requirement (or better) will earn LEED Credit EQ 7.1, Thermal Comfort-Design., except where precluded by other project requirements. Where the contract specifies indoor design temperature , airflow, humidity conditions, etc., use those parameters.

5.8.2.2. High Humidity Areas: Design HVAC systems in geographical areas meeting the definition for high humidity in UFC 3-410-01FA to comply with the special criteria therein for humid areas.

5.8.2.3. Cooling equipment may be oversized by up to 15 percent to account for recovery from night setback. Heating equipment may be oversized by up to 30 percent to account for recovery from night setback. Design single zone systems and multi-zone systems to maintain an indoor design condition of 50% relative humidity for cooling only. For heating only where the indoor relative humidity is expected to fall below 20% for extended periods, add humidification to increase the indoor relative humidity to 30%. Provide ventilation air from a separate dedicated air handling unit (DOAU) for facilities using multiple single zone fan-coil type HVAC systems. Do not condition outside air through fan coil units. Avoid the use of direct expansion cooling coils in air handling units with constant running fans that handle outside air.

5.8.2.4. Locate all equipment so that service, adjustment and replacement of controls or internal components are readily accessible for easy maintenance.

5.8.2.5. Environmental Requirements for Telecommunications Rooms,(including SIPRNET ROOMS, where applicable for specific facility type). Comply with ANSI/EIA/TIA 569 and the I3A.

5.8.2.6. Fire dampers: dynamic type with a dynamic rating suitable for the maximum air velocity and pressure differential to which the damper is subjected. Test each fire damper with the air handling and distribution system running.

5.8.3. BUILDING AUTOMATION SYSTEM. Provide a Building Automation System consisting of a building control network , and integrate the building control network into the UMCS as specified.

The building control network shall be a single complete non-proprietary Direct Digital Control (DDC) system for control of the heating, ventilating and air conditioning (HVAC) systems as specified herein. The building control network shall be an Open implementation of LONWORKS® technology using ANSI/EIA 709.1B as the only communications protocol and use only LonMark Standard Network Variable Types (SNVTs), as defined in the LonMark® Resource Files, for communication between DDC Hardware devices to allow multi-vendor interoperability.

5.8.3.1. The building automation system shall be open in that it is designed and installed such that the Government or its agents are able to perform repair, replacement, upgrades, and expansions of the system without further dependence on the original Contractor. This includes, but is not limited to the following:

- (a) Install hardware such that individual control equipment can be replaced by similar control equipment from other equipment manufacturers with no loss of system functionality.
- (b) Necessary documentation (including rights to documentation and data), configuration information, configuration tools, programs, drivers, and other software shall be licensed to and otherwise remain with the Government such that the Government or its agents are able to perform repair, replacement, upgrades, and expansions of the system without subsequent or future dependence on the Contractor.

5.8.3.2. All DDC Hardware shall:

- (a) Be connected to a TP/FT-10 ANSI/EIA 709.3 control network.
- (b) Communicate over the control network via ANSI/EIA 709.1B exclusively.
- (c) Communicate with other DDC hardware using only SNVTs
- (d) Conform to the LonMark® Interoperability Guidelines.
- (e) Be locally powered; link power (over the control network) is not acceptable.
- (f) Be fully configurable via standard or user-defined configuration parameter types (SCPT or UCPT), standard network variable type (SNVT) network configuration inputs (*nci*), or hardware settings on the controller itself to support the application. All settings and parameters used by the application shall be configurable via standard or

user-defined configuration parameter types (SCPT or UCPT), standard network variable type (SNVT) network configuration inputs (*nci*), or hardware settings on the controller itself

(g) Provide input and output SNVTs required to support monitoring and control (including but not limited to scheduling, alarming, trending and overrides) of the application. Required SNVTs include but are not limited to: SNVT outputs for all hardware I/O, SNVT outputs for all setpoints and SNVT inputs for override of setpoints.

(h) To the greatest extent practical, not rely on the control network to perform the application..

5.8.3.3. Controllers shall be Application Specific Controllers whenever an ASC suitable for the application exists. When an ASC suitable for the application does not exist use programmable controllers or multiple application specific controllers.

5.8.3.4. Application Specific Controllers shall be LonMark Certified whenever a LonMark Certified ASC suitable for the application exists. For example, VAV controllers must be LonMark certified.

5.8.3.5. Application Specific Controllers (ASCs) shall be configurable via an LNS plug-in whenever t an ASC with an LNS plug-in suitable for the application exists.

5.8.3.6. Each scheduled system shall accept a network variable of type SNVT_occupancy and shall use this network variable to determine the occupancy mode. If the system has not received a value to this network variable for more than 60 minutes it shall default to a configured occupancy schedule.

5.8.3.7. Gateways may be used provided that each gateway communicates with and performs protocol translation for control hardware controlling one and only one package unit.

5.8.3.8. Not Used

5.8.3.9. Perform all necessary actions needed to fully integrate the building control system. These actions include but are not limited to:

- Configure M&C Software functionality including: graphical pages for System Graphic Displays including overrides, alarm handling, scheduling, trends for critical values needing long-term or permanent monitoring via trends, and demand limiting.
- Install IP routers or ANSI/CEA-852 routers as needed to connect the building control network to the UMCS IP network. Routers shall be capable of configuration via DHCP and use of an ANSI/CEA-852 configuration server but shall not rely on these services for configuration. All communication between the UMCS and building networks shall be via the ANSI/CEA-709.1B protocol over the IP network in accordance with ANSI/CEA-852.

5.8.3.10. Provide the following to the Government for review prior to acceptance of the system:

- The latest version of all software and user manuals required to program, configure and operate the system.
- Points Schedule drawing that shows every DDC Hardware device. The Points Schedule shall contain the following information as a minimum:
 - Device address and NodeID.
 - Input and Output SNVTs including SNVT Name, Type and Description.
 - Hardware I/O, including Type (AI, AO, BI, BO) and Description.
 - Alarm information including alarm limits and SNVT information.
 - Supervisory control information including SNVTs for trending and overrides.
 - Configuration parameters (for devices without LNS plug-ins) Example Points Schedules are available at <https://eko.usace.army.mil/fa/besc/>
- Riser diagram of the network showing all network cabling and hardware. Label hardware with ANSI.CEA-709.1 addresses, IP addresses, and network names.
- Control System Schematic diagram and Sequence of Operation for each HVAC system.
- Operation and Maintenance Instructions including procedures for system start-up, operation and shut-down, a routine maintenance checklist, and a qualified service organization list.
- LONWORKS® Network Services (LNS®) database for the completed system.
- Quality Control (QC) checklist (below) completed by the Contractor's Chief Quality Control (QC) Representative

Table 5-1: QC Checklist

5.8.3.11. Perform a Performance Verification Test (PVT) under Government supervision prior to system acceptance. During the PVT demonstrate that the system performs as specified, including but not limited to demonstrating that the system is Open and correctly performs the Sequences of Operation.

5.8.3.12. Provide a 1 year unconditional warranty on the installed system and on all service call work. The warranty shall include labor and material necessary to restore the equipment involved in the initial service call to a fully operable condition.

5.8.3.13. Provide training at the project site on the installed building system. Upon completion of this training each student, using appropriate documentation, should be able to start the system, operate the system, recover the system after a failure, perform routine maintenance and describe the specific hardware, architecture and operation of the system.

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5.8.4. TESTING, ADJUSTING AND BALANCING. Test and balance air and hydronic systems, using a firm certified for testing and balancing by the Associated Air Balance Council (AABC), National Environmental Balancing Bureau (NEBB), or the Testing Adjusting, and Balancing Bureau (TABB). The prime contractor shall hire the TAB firm directly, not through a subcontractor. Perform TAB in accordance with the requirements of the standard under which the TAB Firm's qualifications are approved, i.e., AABC MN-1, NEBB TABES, or SMACNA HVACTAB unless otherwise specified herein. All recommendations and suggested practices contained in the TAB Standard shall be considered mandatory. Use the provisions of the TAB Standard, including checklists, report forms, etc., as nearly as practicable to satisfy the Contract requirements. Use the TAB Standard for all aspects of TAB, including qualifications for the TAB Firm and Specialist and calibration of TAB instruments. Where the instrument manufacturer calibration recommendations are more stringent than those listed in the TAB Standard, adhere to the manufacturer's recommendations. All quality assurance provisions of the TAB Standard such as performance guarantees shall be part of this contract. For systems or system components not covered in the TAB Standard, the TAB Specialist shall develop TAB procedures. Where new procedures, requirements, etc., applicable to the Contract requirements have been published or adopted by the body responsible for the TAB Standard used (AABC, NEBB, or TABB), the requirements and recommendations contained in these procedures and requirements are mandatory.

5.8.5. COMMISSIONING: Commission all HVAC systems and equipment, including controls, and all systems requiring commissioning for LEED Enhanced commissioning, in accordance with ASHRAE Guideline 1.1, ASHRAE Guideline 0 and LEED. Do not use the sampling techniques discussed in ASHRAE Guideline 1.1 and in ASHRAE Guideline 0. Commission 100% of the HVAC controls and equipment. Hire the Commissioning Authority (CA), certified as a CA by AABC, NEBB, or TABB, as described in Guideline 1.1. The CA will be an independent subcontractor and not an employee of the Contractor nor an employee or subcontractor of any other subcontractor on this project, including the design professionals (i.e., the DOR or their firm(s)). The CA will communicate and report directly to the Government in execution of commissioning activities. The Contracting Officer's Representative will act as the Owner's representative in performance of duties spelled out under OWNER in Annex F of ASHRAE Guideline 0. All buildings with Minimum LEED Silver (or better) requirement will earn LEED Credit EA3 Enhanced Commissioning.

5.9. ENERGY CONSERVATION

5.9.1. The building including the building envelope, HVAC systems, service water heating, power, and lighting systems shall meet the Mandatory Provisions and the Prescriptive Path requirements of ASHRAE 90.1. Substantiation requirements are defined in Section 01 33 16, Design After Award.

5.9.2. Design all building systems and elements to meet the minimum requirements of ANSI/ASHRAE/IESNA 90.1. Design the buildings, including the building envelope, HVAC systems, service water heating, power, and lighting systems to achieve an energy consumption that is at least 40% below the consumption of a baseline building meeting the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1. Energy calculation methodologies and substantiation requirements are defined in Section 01 33 16, Design After Award.

5.9.3. Purchase Energy Star products, except use FEMP designated products where FEMP is applicable to the type product. The term "Energy Star product" means a product that is rated for energy efficiency under an Energy Star program. The term "FEMP designated product" means a product that is designated under the Federal Energy Management Program of the Department of Energy as being among the highest 25 percent of equivalent products

for energy efficiency. When selecting integral sized electric motors, choose NEMA PREMIUM type motors that conform to NEMA MG 1, minimum Class F insulation system. Motors with efficiencies lower than the NEMA PREMIUM standard may only be used in unique applications that require a high constant torque speed ratio (e.g., inverter duty or vector duty type motors that conform to NEMA MG 1, Part 30 or Part 31).

5.9.4. Solar Hot Water Heating. Provide at least 30% of the domestic hot water requirements through solar heating methodologies, unless the results of a Life Cycle Cost Analysis (LCCA) developed utilizing the Building Life Cycle Cost Program (BLCC) which demonstrates that the solar hot water system is not life cycle cost effective in comparison with other hot water heating systems. The type of system will be established during the contract or task order competition and award phase, including submission of an LCCA for government evaluation to justify non-selection of solar hot water heating. The LCCA uses a study period of 25 years and the Appendix K utility cost information. The LCCA shall include life cycle cost comparisons to a baseline system to provide domestic hot water without solar components, analyzing at least two different methodologies for providing solar hot water to compare against the baseline system.

5.9.5. Process Water Conservation. When potable water is used to improve a building's energy efficiency, employ lifecycle cost effective water conservation measures, except where precluded by other project requirements.

5.9.6. Renewable Energy Features. The Government's goal is to implement on-site renewable energy generation for Government use when lifecycle cost effective. See Paragraph 6, PROJECT SPECIFIC REQUIREMENTS for renewable energy requirements for this project.

5.10. FIRE PROTECTION

5.10.1. STANDARDS AND CODES Provide the fire protection system conforming to APPLICABLE CRITERIA.

5.10.2. Inspect and test all fire suppression equipment and systems, fire pumps, fire alarm and detection systems and mass notification systems in accordance with the applicable NFPA standards. The fire protection engineer of record shall witness final tests. The fire protection engineer of record shall certify that the equipment and systems are fully operational and meet the contract requirements. Two weeks prior to each final test, the contractor shall notify, in writing, the installation fire department and the installation public work representative of the test and invite them to witness the test.

5.10.3. Fire Extinguisher Cabinets: Provide fire extinguisher cabinets and locations for hanging portable fire extinguishers in accordance with NFPA 10 Standard for Portable Fire Extinguishers. The Government will furnish and install portable fire extinguishers, which are personal property, not real property installed equipment.

5.10.4. Fire alarm and detection system: Required fire alarm and detection systems shall be the addressable type. Fire alarm initiating devices, such as smoke detectors, heat detectors and manual pull stations shall be addressable. When the system is in alarm condition, the system shall annunciate the type and location of each alarm initiating device. Sprinkler water flow alarms shall be zoned by building and by floor. Supervisory alarm initiating devices, such as valve supervisory switches, fire pump running alarm, low-air pressure on dry sprinkler system, etc. shall be zoned by type and by room location.

5.10.5. Roof Access: Paragraph 2-9 of UFC 3-600-01 Fire Protection for Facilities will be modified in the next update to that UFC. Pending revision, comply with roof access and stairway requirements in accordance with the International Building Code. Where roof access is required by the IBC or other criteria, comply with UFC 4-010-01, Anti-Terrorist Force Protection, Standard 14. "Roof Access".

5.10.6. Fire Protection Engineer Qualifications: In accordance with UFC 3-600-01, FIRE PROTECTION ENGINEERING FOR FACILITIES, the fire protection engineer of record shall be a registered professional engineer (P.E.) who has passed the fire protection engineering written examination administered by the National Council of Examiners for Engineering and Surveys (NCEES), or a registered P.E. in a related engineering discipline with a minimum of 5 years experience, dedicated to fire protection engineering that can be verified with documentation.

5.11. SUSTAINABLE DESIGN

5.11.1. STANDARDS AND CODES: Sustainable design shall conform to APPLICABLE CRITERIA. See paragraph 6, PROJECT-SPECIFIC REQUIREMENTS for which version of LEED applies to this project. The LEED-NC

Application Guide for Multiple Buildings and On-Campus Building Projects (AGMBC) applies to all projects. Averaging may be used for LEED compliance as permitted by the AGMBC but is restricted to only those buildings included in this project. Each building must individually comply with the requirements of paragraphs ENERGY CONSERVATION and BUILDING WATER USE REDUCTION.

5.11.2. LEED RATING, REGISTRATION, VALIDATION AND CERTIFICATION: See Paragraph PROJECT-SPECIFIC REQUIREMENTS for project minimum LEED rating/achievement level, for facilities that are exempt from the minimum LEED rating, for LEED registration and LEED certification requirements and for other project-specific information and requirements.

5.11.2.1. Innovation and Design Credits. LEED Innovation and Design (ID) credits are acceptable only if they are supported by formal written approval by GBCI (either published in USGBC Innovation and Design Credit Catalog or accompanied by a formal ruling from GBCI). LEED ID credits that require any Owner actions or commitments are acceptable only when Owner commitment is indicated in paragraph PROJECT-SPECIFIC REQUIREMENTS or Appendix LEED Project Credit Guidance

5.11.3. OPTIMIZE ENERGY PERFORMANCE. : Project must earn, as a minimum, the points associated with compliance with paragraph ENERGY CONSERVATION. LEED documentation differs from documentation requirements for paragraph ENERGY CONSERVATION and both must be provided. For LEED-NC v2.2 projects you may substitute ASHRAE 90.1 2007 Appendix G in its entirety for ASHRAE 90.1 2004 in accordance with USGBC Credit Interpretation Ruling dated 4/23/2008.

5.11.4. COMMISSIONING. See paragraph 5.8.5 COMMISSIONING for commissioning requirements. USACE templates for the required Basis of Design document and Commissioning Plan documents are available at <http://en.sas.usace.army.mil> (click on Engineering Criteria) and may be used at Contractor's option.

5.11.5. DAYLIGHTING. Except where precluded by other project requirements, do the following in at least 75 percent of all spaces occupied for critical visual tasks: achieve a 2 percent glazing factor (calculated in accordance with LEED credit EQ8.1) OR earn LEED Daylighting credit, provide appropriate glare control and provide either automatic dimming controls or occupant-accessible manual lighting controls.

5.11.6. LOW-EMITTING MATERIALS. Except where precluded by other project requirements, use materials with low pollutant emissions, including but not limited to composite wood products, adhesives, sealants, interior paints and finishes, carpet systems and furnishings,

5.11.7. CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT. Except where precluded by other project requirements, earn LEED credit EQ 3.1 Construction IAQ Management Plan, During Construction and credit EQ 3.2 Construction IAQ Management Plan, Before Occupancy.

5.11.8. RECYCLED CONTENT. In addition to complying with section RECYCLED/RECOVERED MATERIALS, earn LEED credit MR4.1, Recycled Content, 10 percent except where precluded by other project requirements.

5.11.9. BIOBASED AND ENVIRONMENTALLY PREFERABLE PRODUCTS. Except where precluded by other project requirements, use materials with biobased content, materials with rapidly renewable content, FSC certified wood products and products that have a lesser or reduced effect on human health and the environment over their lifecycle to the maximum extent practicable.

5.11.10. FEDERAL BIOBASED PRODUCTS PREFERRED PROCUREMENT PROGRAM (FB4P). The Farm Security and Rural Investment Act (FSRIA) of 2002 required the U.S. Department of Agriculture (USDA) to create procurement preferences for biobased products that are applicable to all federal procurement (to designate products for biobased content). For all designated products that are used in this project, meet USDA biobased content rules for them except use of a designated product with USDA biobased content is not required if the biobased product (a) is not available within a reasonable time, (b) fails to meet performance standard or (c) is available only at an unreasonable price. For biobased content product designations, see <http://www.biopreferred.gov/ProposedAndFinalItemDesignations.aspx>.

5.12. CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT: Achievement of 50% diversion, by weight, of all non-hazardous C&D waste debris is required. Reuse of excess soils, recycling of vegetation, alternative daily cover, and wood to energy are not considered diversion in this context, however the Contractor

must tracked and report it. A waste management plan and waste diversion reports are required, as detailed in Section 01 57 20.00 10, ENVIRONMENTAL PROTECTION.

5.13. SECURITY (ANTI-TERRORISM STANDARDS): Unless otherwise specified in Project Specific Requirements, only the minimum protective measures as specified by the current Department of Defense Minimum Antiterrorism Standards for Buildings, UFC 4-010-01, are required for this project. The element of those standards that has the most significant impact on project planning is providing protection against explosives effects. That protection can either be achieved using conventional construction (including specific window requirements) in conjunction with establishing relatively large standoff distances to parking, roadways, and installation perimeters or through building hardening, which will allow lesser standoff distances. Even with the latter, the minimum standoff distances cannot be encroached upon. These setbacks will establish the maximum buildable area. All standards in Appendix B of UFC 4-010-01 must be followed and as many of the recommendations in Appendix C that can reasonably be accommodated should be included. The facility requirements listed in these specifications assume that the minimum standoff distances can be met, permitting conventional construction. Lesser standoff distances (with specific minimums) are not desired, however can be provided, but will require structural hardening for the building. See Project Specific Requirements for project specific siting constraints. The following list highlights the major points but the detailed requirements as presented in Appendix B of UFC 4-010-01 must be followed.

- (a) Standoff distance from roads, parking and installation perimeter; and/or structural blast mitigation
- (b) Blast resistant windows and skylights, including glazing, frames, anchors, and supports
- (c) Progressive collapse resistance for all facilities 3 stories or higher. Unless determined otherwise by the Installation and noted in paragraphs 3 or 6, the building shall be considered to have areas of uncontrolled public access when designing for progressive collapse.
- (d) Mass notification system (shall also conform to UFC 4-021-01, Mass Notification Systems)
- (e) For facilities with mailrooms (see paragraph 3 for applicability) – mailrooms have separate HVAC systems and are sealed from rest of building

End of Section 01 11 00

6.0 PROJECT SPECIFIC REQUIREMENTS FORT BLISS, TX

6.1. GENERAL

The requirements of this paragraph augment the requirements indicated in Paragraphs 3 through 5.

6.2. APPROVED DEVIATIONS

The following are approved deviations from the requirements stated in Paragraphs 3 through 5 that only apply to this project.

6.2.1. Irrigation Potable Water Use Reduction . The requirement for 100% reduction in potable water usage for irrigation in Paragraph 5.2.7.1 is waived. Instead, the requirement is to reduce irrigation potable water use 50 percent using LEED credit WE1.1 baseline, except where precluded by other project requirements.

6.3. SITE PLANNING AND DESIGN

6.3.1 General

6.3.1.1. Site Preparation Plan, design, and construct all functional and technical site requirements listed in this project, including erosion control measures, underground conduit, piping, utility service lines and connections (electrical, communications, cable, water, sewer, stormwater, gas, mechanical), etc. within the project limits. The project limits are shown on the drawings. Base the site design upon conceptual site layouts provided in Appendix J.

6.3.1.2. Confine construction limits to the construction site boundaries for the specific facility location for the project.

6.3.1.3. Do not waste excess soil within the project limits without the written approval of the Government.

6.3.1.4. The Government may modify desired building placement within the site area to ensure adequate spacing between buildings and to ensure access is maintained. The Government will provide coordinates for two corners of the approved building location in order for the Contractor's surveyor to stake the site and building location.

6.3.2. Site Structures and Amenities

Provide the following site structures and amenities.:

Dumpster Pad and Enclosure: Design and provide enclosure for dumpsters and recycling bins as required for facility size. Provide 6'-0" high rock wall enclosure. See Appendix J for requirements. Dumpster screening should be compatible with the building they serve and incorporates the concepts defined in the architectural theme in paragraph 6.5..

POV Parking and Access Drives. Design and construct POV parking areas and access drives as outlined in Paragraph 5 and paragraph 6.5 .

Provide fencing and enclosures in accordance with Appendix J.

See Appendices AA and GG for additional requirements for Site Structures and Amenities.

6.3.3. Site Functional Requirements:

6.3.3.1. Stormwater Management (SWM) Systems.

(a) During construction of the facility the Contractor is responsible for SWPPP of the entire construction site limits. Coordinate the laydown spaces, haul roads and fabrication areas within the SWPPP.

(b) Storm Drainage – Design and install Storm Drainage. In areas where underground storm drainage piping exists, coordinate location and size for connection of roof drain leaders to the a storm water system with the Government prior to finalizing building design, but in any event, no later than 45 days prior to beginning building

construction. Coordinate the storm water drainage system plan with the Government prior to finalizing building design. Construct the permanent storm water drainage system concurrently with the construction of the facility and will require coordination with the Installation.

(c) Most of the storm water runoff from the Main Cantonment Area drains via channels and lift stations to the Fort Bliss sump to the north of Fred Wilson Road and east of the Union Pacific Railroad. From the Fort Bliss Sump outlet, storm water drains to a series of basins including Pershing Dam Basin and connects to the river through the City of El Paso's municipal separate storm sewer system (MS4). Fort Bliss Sump and Pershing Dam Basin are the operational responsibility of the City and are located on Fort Bliss Property under long term leases. There are other smaller interconnections with the City of El Paso's MS4 at the post boundary, mainly via curb and gutter flows from access roads to the post.

(d) Storm water drainage from Biggs AAF flight line area is collected via a system of catch-basins and conduits which ultimately flow into a retention pond located east of taxiway G. Prior to the current construction of new Biggs AAF facilities, storm water conveyance within the remaining Biggs Army Airfield area was handled by swales and sheet flow. These flows would then collect in low areas and evaporate and infiltrate over time.

(e) Prior to current development of the East Biggs Area, drainage was via sheet flow through natural topography where storm water would infiltrate and evaporate. The existing Biggs AAF area and the East Biggs Area are being developed using on-site storm water retention basins as there are no natural drainages or adjacent urban drainage infrastructure sufficient to receive the increased post development runoff. Consistent with City of El Paso design requirements, the design criteria used by the Land Development Engineer for the new Biggs AAF and East Biggs infrastructure is the 10 year event for storm water conveyance and 25 year event for storm water retention.

(f) Fort Bliss maintains a TCEQ Multi-Sector General Storm Water Permit (TXR050000) for industrial activities at the post and a Phase II Small (MS4) General Permit (TXR040000) for operation of the installation urban MS4.

(g) Graded Slope and Fills: The angle for graded slopes and fills shall be no greater than the angle that can be retained by vegetative cover or other adequate erosion control devices or structures generally not to exceed 3:1 slope. In any event, plant slopes left exposed will, within 21 calendar days of completion of any phase of grading, or otherwise provide with temporary or permanent ground cover, devices, or structures sufficient to restrain erosion. Demonstrate the angle for graded slopes and fills to be stable. Stable is the condition where the soil remains in its original configuration, with or without mechanical constraints.

(h) Ground Cover: Whenever land-disturbing activity is undertaken on a tract, the entity conducting the land-disturbing activity shall install plant or otherwise provide a permanent ground cover per Fort Bliss seeding specification or Blue Grama, 11.25 Kg/ha of Pure Live Seed, unhulled, for erosion control.

(i) Final Inspection. When all construction on the project is complete, the Erosion and Sediment Control Inspector will evaluate the site and all permanent erosion control features, permanent ground cover and off-site impacts to other properties. If found to be in compliance, a close-out letter will be issued.

(j) Design Storm. Provide erosion and sedimentation control measures, structures, and devices to provide protection from the calculated maximum peak rate of runoff from the twenty-five (25) year storm.

(k) Grade. Provide newly constructed open channels and storm drainage ponds with side slopes no steeper than three horizontal to one vertical if a vegetative cover is used for stabilization unless soil conditions permit a steeper slope or where the slopes are stabilized by using mechanical devices, structural devices, or other acceptable ditch lines. In any event, the angle for side slopes shall be sufficient to restrain accelerated erosion. Typically the storm drainage ponds shall have a 3-strand barb wire fence, except if approved otherwise by the DPW.

(l) Acceptable Management Measures. Measures applied alone or in combination to satisfy the intent of this section are acceptable if there are no objectionable secondary consequences. The Installation recognizes that the management of storm water runoff to minimize or control downstream channel and bank erosion is a developing technology.

6.3.3.2. Erosion and Sediment Control

The Texas Pollutant Discharge Elimination System (TPDES) oversees the Stormwater Sediment and Erosion Control Management Plan for the post. Comply with requirement general permit number TXR150000. Provide and maintain the SWPPP over the life of the project. Qualifying construction activities (greater than 1 acre) in the Texas

portion of the installation are conducted under the TCEQ Construction General Permit (TXR150000) or, in New Mexico, under the EPA Region VI Construction General Permit (FRL-8690-8; EPA-HQ-OW-2008-0238). Construction site operators on Fort Bliss meeting the definition in the permits of primary or secondary operator must comply with the appropriate state construction general permit. Depending on the execution mechanism of the project, the construction site operator may be all, or a combination of the Directorate of Public Works, US Army Corps of Engineers, the Land Development Engineer, Land Development Infrastructure Contractor, Design Build contractor or other entities meeting the definition.

6.3.3.3. Vehicular Circulation.

NOT USED

6.4. SITE ENGINEERING

6.4.1. The existing site survey for the project is included as Appendix OO.. After award, conduct a site survey to establish survey control points and a coordinate system, based on UTM, 13N, WGS83. Identify horizontal and vertical data used. Bring any discrepancies which are found in the existing surveys to the attention of the Contracting Officer.

6.4.2. Existing Geotechnical conditions: See Appendix A for a preliminary geotechnical report.

6.4.2.1. Geotechnical borings, a boring location map, and the raw data on the subsurface conditions described in 5.2.2 are furnished as part of the RFP in Appendix A.

6.4.3. Fire Flow Tests. See Appendix D for Results of Fire Flow Tests to use for Basis of Design for Fire Flow and Domestic Water Supply Registration. In areas under development or planned development, see Appendix D for fire flow data to be used for the basis of proposal preparation and for design in lieu of actual fire flow tests.

6.4.4. Pavement Engineering and Traffic Estimates:

NOT USED

6.4.5. Traffic Signage and Pavement Markings

NOT USED

6.4.6. Base Utility Information (See Appendix J.)

6.4.7. Cut and Fill

NOT USED

6.4.8. Borrow Material

NOT USED

6.4.9. Haul Routes and Staging Areas

6.4.9.1. A Map with available haul routes, construction water distribution point, construction entrance gate, common staging areas, landfill, and borrow areas (if applicable) is included in Appendix J. Disposal areas are off site and are the Contractor's responsibility.

6.4.10. Clearing and Grubbing:

Site grading will include clearing and grubbing for access drives, parking lots, and any site development

6.4.11. Landscaping:

6.4.11.1. Landscaping. Design and install landscaping in accordance with Appendix AA. Install landscaping perimeters required for ATFP

6.4.12. Turf:

NOT USED

6.5. ARCHITECTURE

6.5.1. General: To the maximum extent possible within the contract cost limitation, the buildings shall conform to the look and feel of the architectural style and shall use the same colors as adjacent facilities as expressed herein. The Government will evaluate the extent to which the proposal is compatible with the architectural theme expressed in the RFP during the contract or task order competition. The first priority in order of importance is that the design provides comparable building mass, size, height, and configuration compared to the architectural theme expressed herein. The second priority is that design is providing compatible exterior skin based upon façade, architectural character (period or style), exterior detailing, matching nearby and installation material/color pallets, as described herein.

6.5.2. Design

6.5.2.1. Appendix F is provided "For Information Only", to establish the desired site and architectural themes for the area. Appendix F identifies the desired project look and feel based on the Installation's Architectural Theme from existing and proposed adjacent building forms; i.e. building exterior skin, roof lines, delineation of entrances, proportions of fenestration in relation to elevations, shade and shadow effects, materials, textures, exterior color schemes, and organizational layout.

6.5.2.2. The design should address the installation's identified preferences. Implement these preferences considering the following:

- (a) Achievable within the Contract Cost Limitation
- (b) Meets Milestones within Maximum Performance Duration.
- (c) Achieves Full Scope identified in this Solicitation.
- (d) Best Life-Cycle Cost Design
- (e) Meets the Specified Sustainable Design and LEED requirements.
- (f) Complies with Energy Conservation Requirements Specified in this RFP.

6.5.2.3. Priority #1. Visual Compatibility: Facility Massing (Size, Height, Spacing, Architectural Theme, etc.) Exterior Aesthetic Considerations: The buildings massing, exterior functional aesthetics, and character shall create a comprehensive and harmonious blend of design features that are sympathetic to the style and context of the Installation. The Installation's intent for this area is:

compliance with the East Biggs Town Center Area Development Guide, appendices II- NN, available from the Contracting Officer. Exterior building signage should be similar in construction, style and visual appearance to that installed on the Ft. Bliss Joshua W. Soto Physical Fitness Center. Coordinate with the government on facility name and location.

Site and Architectural conceptual drawings that meet this objective are shown in Appendix J.

6.5.2.4. Priority #2. Architectural Compatibility: Exterior Design Elements (Materials, Style, Construction Details, etc.) Roofs, Exterior Skin, and Windows & Door Fenestrations should promote a visually appealing compatibility with the desired character while not sacrificing the integrity and technical competency of building systems.

6.5.2.5. See Appendix F for exterior colors that apply to Architectural character. The manufacturers and materials referenced are intended to establish color only, and are not intended to limit manufacturers and material selections.

6.5.2.6. Additional architectural requirements:

(a) Install fall protection anchor points on all roofs with a slope greater than 2:12

(b) Architectural Design Objectives

a. 1. Exterior Walls: If a stucco look is desired in the Theme, use more durable materials such as EIFS or stucco-like finish on prefabricated metal panels or concrete panels. If EIFS is used, use a heavy duty reinforcing mesh around all doors and window openings, and extend a minimum 8'0" above finished floor elevation on all exterior walls. The heavy duty reinforcing mesh used on the EIFS shall have a minimum combined weight of 20 ounces per square yard and this standard can be met by using multiple layers. Use high impact mesh on all other surfaces.

2. Roof:

a. Fully adhered, single ply Hypalon 45 mil / TPO 60 mil with a white color finish is required for flat roof systems. Minimum slope for flat roof system shall be 1/4 inch in 12 inches

b. Roof Mounted Equipment: Unless specifically required in Section 3 of the Scope of Work or the standard design provided herein, do not provide roof-mounted equipment. If roof-mounted equipment is provided, use modified bitumen roofing system.

c. Roof access from building exterior is prohibited.

d. Submit a Sample Warranty Certificate and Maintenance Guidelines for government review and concurrence prior to submission of final warranty. Provide a manufacturer's standard 20 year warranty. Warrant for 100 mph wind speed.

3. Trim and Flashing

Gutters, downspouts, and fascias shall be factory pre-finished metal and shall comply with SMACNA Architectural Sheet Metal Manual. Provide for bird habitat mitigation.

4. Bird Habitat Mitigation

Provide details necessary to eliminate the congregating and/or nesting of birds at, on, or in the facility.

5. Connect boot wash drains to underground drainage.

6. Exterior Doors and Frames

a. Main Entrance Doors: Main Entrance Doors: Aluminum storefront doors and frames with Architectural Class 1 anodized finish, fully glazed, with medium or wide stile are preferred for entry into lobbies or corridors.

b. Exterior Non-Main Entrance Doors: Exterior doors and frames opening to spaces other than corridors or lobbies shall be insulated hollow metal.

c. Side Entrance / Exit Doors: Exterior doors and frames opening to corridors shall be insulated hollow metal and comply with ANSI A250.8/SDI 100. Fire-rated openings shall comply with NFPA 80, and the requirements of the labeling authority. Door and frame installation shall comply with applicable codes and UFC 4-010-01 requirements.

7. Exterior Doors Finish and Hardware

a. Hardware General: All hardware in the facility shall be consistent and shall conform to ANSI/BMHA. Standards for Grade 1. Hardware finishes shall conform to ANSI/BHMA A156.18. Provide ANSI 626 (Satin Chromium plated on Brass or Bronze) or 630 (Stainless Steel). Disassembly of knob or lockset is not allowed in order to remove interchangeable core from lockset.

b. Key locksets for mechanical rooms, electrical closets, and Telecommunications Rooms to the existing Post Engineer Key System without key removable cores.

c. Auxiliary Hardware: ANSI/BHMA A156.16. Provide wall or floor stops for all exterior doors that do not have overhead holder/stops. Provide other hardware as necessary for a complete installation.

8. Exterior Windows:

Unless specifically required by the standard design, provide fixed windows. If the standard design requires operable windows, furnish windows with fiberglass or aluminum insect screens removable from the inside, secured with interior metal clips.

9. Exterior Louvers:

Design exterior louvers to exclude wind-driven rain, with bird screens and to withstand wind loads in accordance with the applicable codes. Wall louvers shall bear the AMCA certified ratings program seal for air performance and water penetration in accordance with AMCA 500-D and AMCA 511. Louver finish shall be factory applied color.

10. Roof Hatches:

Roof access hatches shall be a minimum of 16 square feet in opening area, with no dimension smaller than 4'-0". Equip roof hatches with Post Engineer Master Lock on operating hardware.

11. Exterior Signage

See Appendix H for Exterior Signage requirements

12. Additional Requirements

See Appendix AA for additional architectural design requirements.

6.5.3. Programmable Electronic Key Card Access Systems: Not Applicable.

6.5.4. INTERIOR DESIGN

6.5.4.1. Interior building signage requirements: Furnish paper and software for creating text and symbols for computers for Owner production of paper inserts after project completion. Coordinate with user and installation facilities engineer (DPW). Provide Room Number and Room Function signage for all rooms, except apartment modules.

6.5.4.2. Interior Design Considerations:

- (a) Interior Partitions and Walls.
- (b) Interior Glass and Glazing: Coordinate the arrangement of fenestrations with the proposed furniture layout.
- (c) Floors:
- (d) Metal Support Systems

Non-load bearing metal studs and furring shall comply with ASTM C 645; stud gauge shall be as required by height and loading. Metal framing and furring system shall be capable of carrying a transverse load of 5psf without exceeding either allowable stress or a deflection of L/240, but shall not be less than 20 gauge. Provide galvanized finish.

(e) Gypsum Board

Comply with ASTM C 36. Minimum panel thickness shall be 5/8 inch. Provide moisture resistant panels (glass-mat panels are preferred) at locations subject to moisture. Glass-mat gypsum panels or water-resistant "greenboard" gypsum drywall shall be used as substrate for ceramic tile wall applications except at showers where cementitious backer board shall be used. Gypsum Board systems are to be constructed using Joint treatment per ASTM C 475, screws per ASTM C 646, and drywall installation per the requirements of ASTM C 840.

(f) Interior Doors and Frames

Provide hollow metal, flush solid core wood, or hollow core wood doors as specified below. All door frames shall be hollow metal.

- 1. Wood Doors: Provide flush solid core wood doors conforming to WDMA I.S.-1A. Stile edges shall be non-finger jointed hardwood compatible with face veneer. Provide Architectural Woodwork Institute (AWI) Grade A

hardwood face veneer for transparent finished doors; provide AWI Sound Grade hardwood face veneer for painted doors. (Transparent finished doors are preferred.)

2. Wood Doors – Provide hollow core, Type II flush doors conforming to WDMA I.S 1-A. Provide Architectural Woodwork Institute (AWI) Grade A hardwood face veneer for transparent finished doors; provide AWI Sound Grade hardwood face veneer for painted doors. (Transparent finished doors are preferred.)

3. Hollow Metal Doors: Comply with ANSI A250.8/SDI 100. Doors shall be minimum Level 2, physical performance Level B, Model 2; factory primed.

4. Hollow Metal Frames: Comply with ANSI A250.8/SDI 100. Frames shall be minimum Level 2, 16 gauge, with continuously welded corners and seamless face joints; factory primed.

(g) Interior Door Finish Hardware:

1. Hardware General: All hardware in the facility shall be consistent and shall conform to ANSI/BMHA standards for Grade 1. All requirements for hardware keying shall be coordinated with the Contracting Officer. Hardware finish shall conform to ANSI/BHMA A156.18. Provide ANSI 626 (Satin Chromium plated on Brass or Bronze) or 630 (Stainless Steel.)

2. Key locksets for mechanical rooms, electrical closets, telecommunications rooms (TR), and crawl spaces to the existing Post Engineer Key System, consisting of a lever with a dead bolt cylinder above passage lockset, AR-1 keyway, without key removable cores.

3. Auxiliary Hardware: ANSI/BHMA A156.16. Provide other hardware as necessary for a complete installation.

4. Locksets: Provide cylinders and cores with seven-pin tumblers for locks. Cylinders shall be products of one manufacturer, and cores shall be products of one manufacturer. Mortise cylinders, and knobs of bored locksets shall have interchangeable cores that are removable by special control keys. Stamp each interchangeable core with a key control symbol in a concealed place on the core. Cylinders shall be fully compatible with products of the Best Lock Corporation, Arrow Lock Corporation, or Falcon Lock. Submit a core code sheet with the cores. Provide cores master keyed in one system for this project. Disassembly of knob or lockset is not allowed in order to remove interchangeable core from lockset. For interior locksets, use bored type vs. mortise lockset, to the maximum extent possible. The bored type lock will have a metal plate to prevent jimmying of lockset.

(h) Specialties And Furnishings:

1. Window Treatments: Provide aluminum horizontal mini-blinds or roller tube window shades (MechoEuroveil or equal) at all exterior glazing, except where noted otherwise. Provide roller tube window shades at clerestory windows or other difficult to access windows.

(i) Thermal Insulation: Do not install insulation directly on top of suspended acoustical panel ceiling systems.

(j) Elevators: Provide a State of Texas (or State of New Mexico, as applicable) licensed elevator inspector to inspect the elevator, test all new elevators, as applicable to the project, and to certify in writing that the installation meets all requirements.

6.6. STRUCTURAL DESIGN

6.6.1. Site Specific Loading Requirements:

6.6.1.1. The basic wind speed, in miles per hour, for the determination of the wind loads shall be 100 mph 3-second-gust wind speed.

6.6.1.2. Use ground snow load of 5psf.

6.6.1.3. Use frost penetration of zero inches.

6.6.1.4. Use the following seismic acceleration parameters for mapped Maximum Considered Earthquake spectral response at short periods and at 1-second period, respectively: Ss: 31 (%g) and S1: 10 (%g).

6.6.2. Equipment Pads: Elevate floor or on-grade mounted equipment on minimum 4 inch thick concrete pads to prevent accumulation of water and metal corrosion.

6.7. THERMAL PERFORMANCE

There are no additional requirements other than those previously stated/referenced.

6.8. PLUMBING

- 6.8.1. Piping Materials: Use Type K copper for water supply under slab. Use CPVC and Type L (or above) copper for water supply above slabs. Use plastic pipe (schedule 40 PVC) for drainage and venting including under concrete slabs or inside buildings. Do not use exposed PVC for exposed vent piping above roof. Type M copper is not allowed.
- 6.8.2. Cross Connection Control: See the Fort Bliss Cross Connection Control Manual, located in Appendix E, for specific requirements for cross connection control and backflow prevention.
- 6.8.3. Provide gas plumbing for GF Clothes dryers (provided by others).
- 6.8.4. Do not use electric water heaters, except that small on-demand applications may be used.
- 6.8.5. Natural Gas Supply: Furnish standard gas pressures from building regulator of 8-15 ounces, 2 psi or 5 psi.
- 6.8.6. Gas Regulator Venting: Vent all gas regulators in building to the outside
- 6.8.7. Exterior Water Piping Freeze Protection: Design seasonally (not used in winter) utilized water supply piping for complete drain down including interior or below grade isolation valve. Insulate exposed water piping that is utilized year round and heat trace and protect with pipe jacketing to ensure that the piping will not freeze.
- 6.8.8. Fixture Faucet Mixing Valves: Provide single handle type mixing faucet valves with seals and seats combined into one replaceable cartridge; the cartridge shall be designed to be interchangeable between lavatories, bathtubs, kitchen and bar sinks, etc. or provide replaceable seals and seats that are removable either as a seat insert or as a part of a replaceable valve unit. Approved manufacturers are Delta, Kohler, Price Pfister, Crane.
- 6.8.9. Use automatic infrared metered-flow faucets at lavatory sinks in public areas.
- 6.8.10. Not Used
- 6.8.11. Provide cast iron valve boxes and covers. Water meter vaults shall have covers weighing 20 lbs or less or shall have a closeable opening in the cover directly above the meter to allow reading of the meter. Distance from top of cover to top of water meter consumption reading (dial) shall be less than 18 inches.

6.9. SITE ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

- 6.9.1. Exterior Lighting: Exterior site and area lighting, including lighting for parking areas, roadways, walkways, and ball courts shall be high pressure sodium, except compact fluorescent lighting shall be acceptable for walkway lighting. Photo control devices for exterior lighting shall conform to ANSI C136.10 and shall have an adjustable operation range of approximately 0.5 to 5.0 footcandles.
- 6.9.2. Utility Metering: Provide Watt Node Plus LON Electric Power meter or equal. Provide pulse meter for gas and water. Provide a legibly and indelibly printed multiplier on the face of the meter. Wiring for UMCS system shall be compatible with Fort Bliss system. Install communications wiring in a 1" conduit from the Mechanical Room to the Pulse Kit on the Gas Meter for use by the UMCS system. Install communications wiring in a 1" conduit from the Mechanical Room to the Electric Meter for use by the UMCS system. Install communications wiring in a 1" conduit from the Mechanical Room to the Pulse Kit on the Water Meter for use by the UMCS system
- 6.9.3. Exterior Communications: Install communications infrastructure as required by the drawings in Appendix J. Cable TV is to be included in the Site Communication duct bank. Coordinate with Fort Bliss DOIM / NEC Plans Office.
- 6.9.4. Corrosion Control: Obtain the services of a "corrosion expert" to design, supervise, inspect, and test the installation and performance of the cathodic protection system. "Corrosion expert" refers to a person, who by thorough knowledge of the physical sciences and the principles of engineering and mathematics, acquired by

professional education and related practical experience, is qualified to engage in the practice of corrosion control of buried or submerged metallic surfaces. Such a person must be accredited or certified by the National Association of Corrosion Engineers (NACE) as a NACE Accredited Corrosion Specialist or a NACE certified Cathodic Protection (CP) Specialist or be a registered professional engineer who has certification or licensing that includes education and experience in corrosion control of buried or submerged metallic piping and tank systems, if such certification or licensing includes 5 years experience in corrosion control on underground metallic surfaces of the type under this contract. The corrosion expert shall obtain soil resistivity data, acknowledging the type of pipeline coatings to be used and reporting to the Contractor the type of cathodic protection required. Use sacrificial anode type cathodic protection.

6.10. FACILITY ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

6.10.1. Facility Telecommunications systems:

6.10.1.1. Telephone and Local Area Network (LAN):

- (a) All equipment racks shall have both vertical and horizontal cable management.
- (b) Line all walls in the telecommunications rooms with 4' X 8' X 3/4" plywood, painted flat white. All plywood shall be fire-rated and the fire-retardant stamp are shall remain unpainted and open to view. Provide a ladder type cable tray around the perimeter of the telecommunications room and from the perimeter ladder tray to the 19" communications rack. Mount the ladder cable tray 7-1/2 feet above finished floor. Install all horizontal cabling into the TR in this cable tray routing them around the room and into the 19" rack.
- (c) Terminate the incoming fiber optic cable on a 19" twelve port single mode fiber optic patch panel with SC type connectors.
- (d) No construction deviations in the communications system from the accepted design will be permitted without prior Government review and concurrence.
- (e) Submit a detailed test plan for all the cable plant installation for government review and concurrence. Include information on the test equipment and its calibration documentation.
- (f) Feed all electrical circuits within a TR from an electrical panel installed within that room.
- (g) Provide a 1" conduit from the electrical panel in the TR to outside of the building for future commercial cable television power. Provide a 2" conduit (adjacent to the 1" conduit) from the TR to outside of the building for future commercial cable television service entrance.
- (h) Terminate Single-Mode and Multi-Mode Fiber Optic cables on separate patch panels.
- (i) Terminate voice and data cables on separate patch panels located in the same equipment rack. Install voice patch panels in the copper equipment rack or cabinet.
- (j) All raised flooring shall have a cable tray management system in compliance with UFC 3-580-01 under the floor for communications cabling. Submit a cable management plan showing cable routing and cable management system installation for review and concurrence prior to commencement of work.
- (k) Install the horizontal cabling conduit from the outlet box, extending to the cable tray. The use of J-hooks is not permitted without prior written approval.
- (l) Terminate exterior communications drops for testing purposes and cover with a blank weatherproof faceplate.
- (m) Use green insulation on all bonding jumpers, regardless of size.
- (n) Floor mount communications and power drops to be used by modular furniture including those for modular furniture near a wall. Submit a communications and power plan showing locations of communications and power drops superimposed over modular furniture plan with the interim and final design packages.
- (o) Manholes shall be splayed type communications MH's with preinstalled terminators and internal grounding.
- (p) Provide lockable, waterproof CMH covers. Submit for approval prior to use in accordance with Fort Bliss Force Protection Standards.
- (q) Use the following color scheme for Telecommunications wiring and voice/data jacks:
 - NIPRNET – Green
 - SIPRNET – Red

TACNET – Yellow

Voice - Gray

6.10.2. Cable TV (CATV): Provide and install a pre-wired CATV system throughout the designated spaces. CATV system shall include but not limit to cables, conduits, pull boxes, and CATV jacks. Route all CATV signals conduits and cables back to the telecommunication room.

6.10.3. Closed Circuit TV (CCTV): Provide and install a conduit system to support CCTV throughout the designated spaces. Conduit system shall include but not limit to conduits, pull boxes, and pull wires. Route all conduits for CCTV signals back to the designated monitoring room. As part of the Interim Design Review, present the proposed Floor Plan to representatives of Fort Bliss and 1AD Security personnel to identify specific locations of security cameras, location of monitoring room, conduit routing, and system details.

6.10.4. Intrusion Detection (IDS): Provide and install conduit for IDS in the designated areas. The devices (motion sensors, contact switches, duress buttons, keypads and security panels) are provided by others. Provide conduit and a junction box for each device. Route all device conduits to a j-box in a designated wall space (for a security panel) near the entrance of the room. Provide and install a 1" conduit with a Category 6 cable routed from the j-box to the nearest communications room. Terminate and certify the cable inside the j-box on an RJ-45 Female Jack and inside the communications room on a patch panel. Provide a dedicated 120V single-phase circuit for IDS.

6.10.5. General: Ground and bond all inside plant cable pathways (e.g. cable trays, cable ladders, and conduits) to the Main Telecommunication Room (TR) ground bar (TMGB). Bond Individual sections of all metallic cable tray and ladder systems to each other and to the raceway (e.g. EMT) in which they support.

6.10.6. Landscape/Irrigation Controls – Provide power and outlet to accommodate the irrigation controller for each building. Make space available for the irrigation controller in the mechanical room or where designated by the Government.

6.10.7. Not Used

6.10.8. Outside electrical panels: all electrical panels located in exterior areas shall be dustproof.

6.10.9. Control exterior security lighting by a switch and photocell.

6.10.10. Not Used

6.10.11. Where SIPRNET is required, the USAISEC-FDED SIPRNET Team will determine and engineer the SIPRNET.

6.11. HEATING, VENTILATING, AND AIR CONDITIONING

6.11.1. General: The existing UMCS is LonWorks Open.

6.11.2. System Selection: Current local utility rates for gas, electric, water and sewer are contained in Appendix K. These are rates paid by Fort Bliss to the local utility providers and are for use in LEED energy cost calculations. Provide CO2 sensors in return air stream to minimize the amount of outside air required to satisfy ASHRAE 62.1 requirements for building Indoor Air Quality. Provide one CO2 sensor per HVAC zone. Installation infrastructure has insufficient capacity to support use of electric HVAC systems. Provide gas-fired and/or renewable energy sources for heating.

6.11.3. Communication Rooms: Air condition communications equipment rooms to space comfort conditions as per applicable criteria by separate year round direct expansion cooling systems.

6.11.4. Mechanical Room Ventilation: Automatically ventilate mechanical, fire protection, electrical, and storage spaces to limit space temperatures to 10 degrees F above design outdoor air temperature.

6.11.5. Equipment Coordination: For Variable Air Volume (VAV) systems, limit size of any individual VAV box to approximately 2500 cfm to promote better zoning and fit of equipment to space available. Coordinate all mechanical systems and equipment with space available to prevent conflict with other building systems.

6.11.6. UMCS Base-wide System and Building Control Interface: A base-wide UMCS/EMCS system has been installed as part of a separate contract. Provide a 3/4" conduit with CAT VI cable from the EMCS router to the nearest comm room for connection to the building LAN. Integration to the base-wide system shall be done under separate contract and is not part of this scope of work. The building shall be capable of running stand alone until such time it is integrated into the base-wide system. Energy saving controls are desired such as schedule start/stop, optimized start/stop, occupancy sensors, etc. Locate AC control panels and routers in the Mechanical Room.

6.11.7. Existing IP Network: Existing IP network consist of Gig-backbone: 10/100MB to the user, 1GB between the end user building and ADN, and a 10GB core backbone.

6.11.8. Network Media: Existing network media consist of single-mode fiber optic.

6.11.9. Head-end hardware/Software location: Location of head-end UMCS hardware/software will be in Bldg. 777.

6.11.10. Water Quality Analysis and Treatment: Water quality for Fort Bliss and surrounding area is 'hard'. Treatment will be required for use as make-up water in HVAC equipment. Water Quality Analysis reports are inserted as Appendix DD. Additional water analysis data from water treatment contractor (POC: Gary Hamilton, Delta Water Laboratories, 915-892-8227) are as follows:

Chlorides: 70 ppm

P Alkalinity: 0 ppm

M Alkalinity: 100 ppm (Total alkalinity)

Total Hardness: 130 ppm (CaCO₃)

ph: 7.89

Silica: 4 to 7 ppm (Can go as high as 11 ppm)

Iron: 0.01- 0.5 Reactive

Total Dissolved Solids: 475 to 680 ppm

Coordinate with water treatment contractor to confirm above data and current water treatment methods to obtain the required quantity and types of chemicals to be initially introduced into the closed loop heating and chilled water systems. Material Safety Data Sheets for current Ft. Bliss DPW chemical treatment method for hydronic water systems (Boiler heating hot water and chilled water) are contained in Appendix EE (Corrshield NT402).

6.11.11. Coordinate locations of emergency shut-off switches, central control area, and switch features with Fort Bliss DPW during design.

6.11.12. Not Used

6.11.13. HVAC Controls: Admin/Classrooms/Labs/Dining Facilities are to have a three-hour override switch on the thermostat.

6.11.14. HVAC Controls in Apartment Areas: The preference is that thermostatic control in each living unit be adjustable in allowing 2 deg F adjustment either side of design setpoints for heating and cooling. The UMCS system shall control the +/- 2 Deg F range limits and shall not be adjustable by the area occupant.

6.11.15. HVAC system preferences and requirements are:

(a) For air-conditioned core and related areas (central core work rooms, offices, conference rooms, laboratories, electronics repair shops, etc.): the preference is for heating, ventilating and air-conditioning systems that provide appropriate zoning and number of zones to allow comfort in spaces with varying occupancy (by time of day, etc.), exterior exposures, and internal loads due to equipment, door usage, etc. The expectation is for more rather than less zones to create an optimum balance of initial cost versus occupant comfort for peak human efficiency based upon temperature setpoints and thermal comfort requirements of this RFP. System complexity: provide integrated HVAC air handling system or systems that are only complex enough to meet all energy, quality and system longevity requirements and other goals of this RFP; this may entail economizers, will require proper air filtration provisions, etc.; additionally systems shall be fully accessible for maintenance and shall be easily and completely replaceable via removal through mechanical room doors, etc. HVAC system cooling shall occur within the HVAC air handling system(s) and be provided by electric refrigerated means, such as electric direct expansion, chilled water or other refrigerated cooling system..

(b) Mechanical and Fire Protection Room Heating and Ventilation; It is preferred that main mechanical and/or fire protection equipment spaces be heated with gas or hydronic unit heaters.

6.11.16. Piping Materials: Do not use Type M copper.

6.11.17. Equipment Placement: Place air handling equipment within the building spaces (i.e. equipment rooms, etc.) which are sound isolated, within exterior on-grade equipment yards which are enclosed with screen walls. Or, if placed on roof, provide equipment with screening to prevent viewing of the equipment from a point 6 feet above any ground level at a distance of up to 300 feet from the building exterior wall in any direction. Organize vents, stacks, grilles, and placement of mechanical or electrical service fixtures into locations which do not provide visually negative design impacts. Avoid catwalks, especially when up and down travel is required to service multiple equipment pieces (coordinate with Architectural designer). Enclose mechanical and electrical equipment (transformers, chillers, boilers, etc.) installed at grade with screen walls. Screen wall finishes and appearance are subject to Government review and approval.

6.12. ENERGY CONSERVATION

6.12.1. Inclusion of Renewable Energy Features. The following renewable energy features have been determined lifecycle cost effective, are included in the project budget and shall be provided:

No additional requirements

6.13. FIRE PROTECTION

6.13.1. The Fire Alarm Control Panel shall be fully compatible with the existing Monaco system presently in use at Fort Bliss. See Section 6.13.8 below for additional requirements.

6.13.2. HVAC Equipment Restart: After a fire alarm shut-down is cleared at fire alarm panel, affected mechanical equipment shall automatically restart.

6.13.3. Sprinkler Freeze Protection: Provide temperature sensor and alarm to notify fire department of possible freezing conditions for wet pipe sprinkler systems in spaces where heat may not be available due to being unoccupied or heating system may have failed.

6.13.4. Riser Location: Install fire risers in dedicated space or mechanical room with external access for fire department.

6.13.5. Provide and install a Fire Department Connection near the street curb, PIV, and fire hydrant. Coordinate exact location of Fire Department Connection with LDE and Fort Bliss Fire Department.

6.13.6. Fire Sprinkler Backflow Prevention: Backflow prevention shall be in accordance with the Fort Bliss Cross-Connection Control Manual. This requirement may be more stringent than the requirement in UFC 3-600-01.

6.13.7. Fire Alarm System:

- 6.13.7.1. The RF Transceiver shall be compatible with the Fire Department receiving system, operating on an RF frequency.
- 6.13.7.2. The RF transceiver shall be a Monaco BT-XM or approved equal operating on a frequency of 165.0625 MHZ.
- 6.13.7.3. The Fire alarm receiving system is a Monaco D-21 system.
- 6.13.7.4. The information sent to the Fire Department receiving system shall be zone by zone information.
- 6.13.7.5. All tamper devices shall be sent to the D-21 system as a supervisory tamper.
- 6.13.7.6. All initiating devices shall be connected, Style D, to signal line circuits (SLC), Style 6.
- 6.13.7.7. All alarm appliances shall be connected to notification appliance circuits (NAC), Style Z.
- 6.13.7.8. Provide photoelectric smoke detectors with 2.5% obscuration, pigtails for permanent connections, continuous power indicator light, test button, and metal base.
- 6.13.7.9. RF transceiver shall be equipped with a directional antenna.
- 6.13.7.10. Fire alarm pull boxes shall be of metal construction, dual-action, and key operable."
- 6.13.8. Provide keyed alike fire alarm panels, keys C415A, 17021, & PK625; C415 for MNS panels. PK625 on manual pull stations. Sample keys are available from Fort Bliss Fire Department upon request..
- 6.13.9. Not Used.
- 6.13.10. Do not use glass or lockable doors in fire extinguisher cabinets.
- 6.13.11. Mass Notification System. Mount a speaker system on the exterior of the building that will cover a 16' wide area around the perimeter of the buildings.
- 6.13.11.1. Connect the MNS to the Fort Bliss Fire Alarm System utilizing the Monaco BT-XM All equipment must be compatible with the existing Monaco D21 Central Receiving Unit utilized by the Fort Bliss Fire Department.
- 6.13.11.2. Program the following 8 pre-recorded messages into the system:
- (a) MESSAGE #1. Label message "Fire". Five seconds of siren are played, followed by the message:
- "Attention, attention. A fire emergency has been reported. Please leave the building using the nearest exit or exit stairway. "Do not use the elevators if installed within this facility".
- (b) MESSAGE #2. Label message "Severe Weather." Five seconds of 100-kHz steady tone are played, followed by the message:
- "This is the Fort Bliss Installation Operations Center. The National Weather Service has issued a severe weather alert for this area. Turn on your radios or televisions for the latest update and take required action. Again, this is the Fort Bliss Installation Operations Center. The National Weather Service has issued a severe weather alert for this area. Turn on your radios or televisions for the latest update and take required action.
- (c) MESSAGE #3. Label message "Bomb" A horn sound is played for 5 seconds, followed by the message:
- "Attention, attention. This building has received a bomb threat. All personnel are to evacuate immediately using the nearest exit and to report to our designated re-assembly area for accountability and additional instruction. Again, this building has received a bomb threat. All personnel are to evacuate immediately using the nearest exit and to report to our designated re-assembly area for accountability and for additional instruction.
- (d) MESSAGE # 4. Label message "Shelter In Place" Three 1-kHz tones (one second each) are played, followed by the message:

"Attention, attention. All personnel "shelter in place". Turn off fans, heating, ventilation and air condition systems. Close all doors and windows and remain indoors until the "All Clear" announcement is given."

(e) MESSAGE #5. Label message "FPCON C" Three seconds of HI/LOW tones, followed by the message:

"Attention, attention. Fort Bliss is now at FPCON Charlie. Implement FPCON Alpha, Bravo and Charlie security plans immediately. Again, Fort Bliss is now at FPCON Charlie. Implement FPCON Alpha, Bravo and Charlie security plans immediately and stand by for additional information from the Fort Bliss Installation Operation Center.

(f) MESSAGE # 6. Label message "FPCON D" Three seconds of HI/LOW tones, followed by the message:

"Attention, attention. Fort Bliss is now at FPCON Delta. Implement all FPCON security plans, Alpha through Delta immediately. Again, Fort Bliss is now at FPCON Delta. Implement all FPCON security plans, Alpha through Delta immediately and stand by for additional information from the Fort Bliss Installation Operation Center.

(g) MESSAGE #7. Label message "All Clear". Five seconds of chime sound are played, followed by the message:

"The emergency has now ended. Please resume normal operations. Thank you for your cooperation."

(h) MESSAGE #8. Label message "Test" A 1-kHz tone is sounded for 2 seconds, followed by the message:

"May I have your attention, please? This is the Fort Bliss Installation Operations Center conducting a test of the mass notification system. Repeat, this is only a test."

6.14. SUSTAINABLE DESIGN

6.14.1. LEED Rating Tool Version. Execute the project using LEED-NC Version 2.2.

6.14.2. The minimum requirement for this project is to achieve LEED Silver level. Each non-exempt facility (building plus sitework) must achieve this level. In addition to any facilities indicated as exempt in paragraph 3, the following facilities are exempt from the minimum LEED achievement requirement: None.

6.14.3. Credit Validation: LEED registration, compiling of documentation at LEED OnLine and use of the LEED Letter Templates is required. Registration and payment of registration fees will be by the Government. Administration/team management of the online project will be by the Contractor. Validation of credits will be accomplished by the Government. LEED certification of the project by the Contractor is not required. The Government may choose to seek LEED certification of the project, in which case the Government will pay certification fees and coordinate with the GBCI and the Contractor will furnish audit data as requested at no additional cost.

6.14.4. Commissioning: See Appendix M for Owner's Project Requirements document(s).

6.14.5. LEED Credits Coordination. The following information is provided relative to Sustainable Sites and other credits.

SS Credit 1 Site Selection:

Project site IS NOT considered prime farmland.

Project site is five feet or more above 100-year flood elevation.

Project site contains no habitat for threatened or endangered species.

No portion of project site lies within 100 feet of any water, wetlands or areas of special concern.

Project site WAS NOT previously used as public parkland.

SS Credit 2 Development Density & Community Connectivity.

Project site DOES NOT meets the criteria for this credit.

SS Credit 3 Brownfield Redevelopment.

Project site DOES NOT meets the criteria for this credit.

SS Credit 4.1 Public Transportation Access.

Project site DOES NOT meets the criteria for this credit.

EA Credit 6 Green Power.

35% of the project's electricity WILL NOT will be provided through an Installation renewable energy contract. Do not purchase Renewable Energy Credits (REC's) to earn this credit.

MR Credit 2 Construction Waste Management.

The Installation does not have an on-post recycling facility available for Contractor's use.

6.14.6. LEED Credit Preferences, Guidance and Resources. See Appendix L LEED Project Credit Guidance for supplemental information relating to individual credits.

6.14.7. Not Used

6.14.8. Additional Information

6.14.8.1 Coordinate with the Government to input Government-achieved Credits into the project's online template. Submit documentation of LEED Credits to the Government in PDF format on three (3) CD's with formatting and directory structure designed for easy access to documentation. Submit LEED Design Credit documentation to the Government no later than 60 days after issuance of Design Complete documents. Submit LEED Construction Credit documentation to the Government no later than 60 days after Construction Complete as awarded.

6.14.8.2 Appendix M contains a modified LEED v2.2 Registered Project Checklist. This checklist identifies:

- 1) those specific Credits/Prerequisites that the DB Contractor must provide, listed in the "Yes DB" column,
- 2) those Credits/Prerequisites that the Government will provide, listed in the "Yes GOV" column,
- 3) points that the DB Contractor may provide, above and beyond those points required per LEED prerequisite or elsewhere in the RFP (applies to Energy and Atmosphere Credit 1, where 2 points are required under EA Prerequisite 2, but an additional 8 points may be achieved at the DB Contractor's option) listed in the "? D/B" column,
- 4) those Credits that may be possible by the Government, but should not be considered in the total point count by the DB Contractor, listed in the "? GOV" column, and
- 5) those Credits that the DB Contractor is prohibited from pursuing, listed in the "NO" column.

6.14.8.3 In addition to the 11 specific Credits that the DB Contractor is required to provide by the Checklist in Appendix M, achieve an additional 17 credits to be selected by the DB Contractor.

6.15. ENVIRONMENTAL

6.15.1. Do not use Asbestos containing materials in the new construction.

6.15.2. The impacts of the Fort Bliss Expansion have been adequately addressed in the Fort Bliss, Texas and New Mexico Mission and Master Plan Programmatic Environmental Impact Statement (MMPEIS). The environmental documents that apply to this task order are the City of El Paso Rule Regulation #9 (available at http://www.epwu.org/PDF/rules_regs.pdf), as well as the following documents included in Appendix E: Potable Regulatory Policy (Policy Letter #16, Cross connection control manual for Fort Bliss, Installation environmental Noise Management Plan, Installation hazardous waste management plan, and the Cost Schedule for Hazmat disposal. Comply with all Federal, State, and Local environmental requirements.

6.16. PERMITS

6.16.1. Obtain digging permit from Fort Bliss DPW, unless any government installed utilities have not been turned over to Fort Bliss. In this case, coordinate with USACE prior to any digging.

6.16.2. See Appendix FF for Fort Bliss Access Control Policy

See Appendix FF for information on Fire Prevention Contractor's Guide and Standard Excavation Request.

6.17. DEMOLITION

6.17.1 See Appendix E.

6.18. ADDITIONAL FACILITIES

None.

End of Section 01 10 00.0001

**SECTION 01 33 00.0001
SUBMITTAL PROCEDURES
(DESIGN-BUILD TASK ORDERS)**

1.0 GENERAL

1.13. GOVERNMENT APPROVED OR CONCURRED WITH SUBMITTALS

1.14. INFORMATION ONLY SUBMITTALS

1.0 GENERAL

1.1.1. This section contains requirements specifically applicable to this task order. The requirements of Base ID/IQ contract Section 01 33 30 apply to this task order, except as otherwise specified herein.

1.13. GOVERNMENT APPROVED OR CONCURRED WITH SUBMITTALS

Upon completion of review of submittals requiring Government approval or concurrence, the Government will stamp and date the submittals as approved or concurred. The Government will retain one (1) copies of the submittal and return zero(0) copy(ies) of the submittal.

1.14. INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe. The Government will retain zero(0) copies of information only submittals.

End of Section 01 33 00.0001

SECTION 01 33 16 DESIGN AFTER AWARD

1.0 GENERAL INFORMATION

1.1. INTRODUCTION

1.2. DESIGNER OF RECORD

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. PRE-WORK ACTIVITIES & CONFERENCES

3.1.1. Design Quality Control Plan

3.1.2. Post Award Conference

3.1.3. Partnering & Project Progress Processes

3.1.4. Initial Design Conference

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3.2. STAGES OF DESIGN SUBMITTALS AND OVER THE SHOULDER PROGRESS REVIEWS

3.2.1. Site/Utilities

3.2.2. Interim Design Submittals

3.2.3. Over-the-Shoulder Progress Reviews

3.2.4. Final Design Submissions

3.2.5. Design Complete Submittals

3.2.6. Holiday Periods for Government Review or Actions

3.2.7. Late Submittals and Reviews

3.3. DESIGN CONFIGURATION MANAGEMENT

3.3.1. Procedures

3.3.2. Tracking Design Review Comments

3.3.3. Design and Code Checklists

3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

3.4.1. General

3.4.2. Procedures

3.4.3. Conference Documentation

3.5. INTERIM DESIGN REQUIREMENTS

3.5.1. Drawings

3.5.2. Design Analyses

3.5.3. Geotechnical Investigations and Reports

3.5.4. LEED Documentation

3.5.5. Energy Conservation

3.5.6. Specifications

3.5.7. Building Rendering

3.5.8. Interim Building Design Contents

3.6. FINAL DESIGN REVIEWS AND CONFERENCES

3.7. FINAL DESIGN REQUIREMENTS

3.7.1. Drawings

3.7.2. Design Analysis

3.7.3. Specifications

3.7.4. Submittal Register

3.7.5. Preparation of DD Form 1354 (Transfer of Real Property)

3.7.6. Acceptance and Release for Construction

3.8. DESIGN COMPLETE CONSTRUCTION DOCUMENT REQUIREMENTS

3.9. SUBMITTAL DISTRIBUTION, MEDIA AND QUANTITIES

3.9.1. Submittal Distribution and Quantities

3.9.2. Web based Design Submittals

3.9.3. Mailing of Design Submittals

3.10. AS-BUILT DOCUMENTS

ATTACHMENT A STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS

ATTACHMENT B FURNITURE, FIXTURES AND EQUIPMENT REQUIREMENTS

ATTACHMENT C TRACKING COMMENTS IN DRCHECKS

ATTACHMENT D SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

ATTACHMENT E LEED SUBMITTALS

ATTACHMENT F BUILDING INFORMATION MODELING REQUIREMENTS

ATTACHMENT G DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT

1.0 GENERAL INFORMATION

1.1. INTRODUCTION

1.1.1. The information contained in this section applies to the design required after award. After award, the Contractor will develop the accepted proposal into the completed design, as described herein.

1.1.2. The Contractor may elect to fast track the design and construction that is, proceed with construction of parts of the sitework and facilities prior to completion of the overall design. To facilitate fast tracking, the Contractor may elect to divide the design into no more than six (6) design packages per major facility type and no more than three (3) design packages for site and associated work. Designate how it will package the design, consistent with its overall plan for permitting (where applicable) and construction of the project. See Sections 01 33 00 SUBMITTAL PROCEDURES and 01 32 01.00 10 PROJECT SCHEDULE for requirements for identifying and scheduling the design packaging plan in the submittal register and project schedule. See also Sections 01 10 00 STATEMENT OF WORK and 01 57 20.00 10 ENVIRONMENTAL PROTECTION for any specified permit requirements. If early procurement of long-lead item construction materials or installed equipment, prior to completion of the associated design package, is necessary to facilitate the project schedule, also identify those long-lead items and how it will assure design integrity of the associated design package to meet the contract requirements (The Contract consists of the Solicitation requirements and the accepted proposal). Once the Government is satisfied that the long-lead items meet the contract requirements, the Contracting Officer will allow the Contractor to procure the items at its own risk.

1.1.3. The Contractor may proceed with the construction work included in a separate design package after the Government has reviewed the final (100%) design submission for that package, review comments have been addressed and resolved to the Government's satisfaction and the Contracting Officer (or the Administrative Contracting Officer) has agreed that the design package may be released for construction.

1.1.4. **INTEGRATED DESIGN.** To the maximum extent permitted for this project, use a collaborative, integrated design process for all stages of project delivery with comprehensive performance goals for siting, energy, water, materials and indoor environmental quality and ensures incorporation of these goals. Consider all stages of the building lifecycle, including deconstruction.

1.2. DESIGNER OF RECORD

Identify, for approval, the Designer of Record ("DOR") that will be responsible for each area of design. One DOR may be responsible for more than one area. Listed, Professional Registered, DOR(s) shall account for all areas of design disciplines shall be accounted for by a listed. The DOR's shall stamp, sign, and date each design drawing and other design deliverables under their responsible discipline at each design submittal stage (see contract clause Registration of Designers). If the deliverables are not ready for release for construction, identify them as "preliminary" or "not for release for construction" or by using some other appropriate designation. The DOR(s) shall also be responsible for maintaining the integrity of the design and for compliance with the contract requirements through construction and documentation of the as-built condition by coordination, review and approval of extensions of design, material, equipment and other construction submittals, review and approval or disapproval of requested deviations to the accepted design or to the contract, coordination with the Government of the above activities, and by performing other typical professional designer responsibilities.

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. PRE-WORK ACTIVITIES & CONFERENCES

3.1.1. Design Quality Control Plan

Submit for Government acceptance, a Design Quality Control Plan in accordance with Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL before design may proceed.

3.1.2. Post Award Conference

3.1.2.1. The government will conduct a post award contract administration conference at the project site, as soon as possible after contract award. This will be coordinated with issuance of the contract notice to proceed (NTP). The Contractor and major sub-contractor representatives shall participate. All designers need not attend this first meeting. Government representatives will include COE project delivery team members, facility users, facility command representatives, and installation representatives. The Government will provide an agenda, meeting goals, meeting place, and meeting time to participants prior to the meeting.

3.1.2.2. The post award conference shall include determination and introduction of contact persons, their authorities, contract administration requirements, discussion of expected project progress processes, and coordination of subsequent meetings for quality control (see Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL), Partnering (see below and SCR: Partnering), and the initial design conference (see below).

3.1.2.3. The government will introduce COE project delivery team members, facility users, facility command representatives, and installation representatives. The DB Contractor shall introduce major subcontractors, and other needed staff. Expectations and duties of each person shall be defined for all participants. A meeting roster shall be developed and distributed by the government with complete contact information including name, office, project role, phone, mailing and physical address, and email address.

3.1.3. Partnering & Project Progress Processes

3.1.3.1. The initial Partnering conference may be scheduled and conducted at any time with or following the post award conference. The Government proposes to form a partnership with the DB Contractor to develop a cohesive building team. This partnership will involve the COE project delivery team members, facility users, facility command representatives, installation representatives, Designers of Record, major subcontractors, contractor quality control staff, and contractor construction management staff. This partnership will strive to develop a cooperative management team drawing on the strengths of each team member in an effort to achieve a quality project within budget and on schedule. This partnership will be bilateral in membership and participation will be totally voluntary. All costs, excluding labor and travel expenses, shall be shared equally between the Government and the Contractor. The Contractor and Government shall be responsible for their own labor and travel costs. Normally, partnering meetings will be held at or in the vicinity of the project installation.

3.1.3.2. As part of the partnering process, the Government and Contractor shall develop, establish, and agree to comprehensive design development processes including conduct of conferences, expectations of design development at conferences, fast-tracking, design acceptance, Structural Interior Design (SID)/ Furniture, Fixtures & Equipment (FF&E) design approval, project closeout, etc. The government will explain contract requirements and the DB Contractor shall review their proposed project schedule and suggest ways to streamline processes.

3.1.4. Initial Design Conference

The initial design conference may be scheduled and conducted at the project installation any time after the post award conference, although it is recommended that the partnering process be initiated with or before the initial design conference. Any design work conducted after award and prior to this conference should be limited to site and is discouraged for other items. All Designers of Record shall participate in the conference. The purpose of the meeting is to introduce everyone and to make sure any needs the contractor has are assigned and due dates established as well as who will get the information. See also Attachment F, BUILDING INFORMATION MODELING REQUIREMENTS for discussion concerning the BIM Implementation Plan demonstration at this meeting. The DB Contractor shall conduct the initial design conference.

3.1.5. Pre-Construction Conference

Before starting construction activities, the Contractor and Government will jointly conduct a pre-construction administrative conference to discuss any outstanding requirements and to review local installation requirements for start of construction. It is possible there will be multiple Pre-Construction Conferences based on the content of the design packages selected by the Contractor. The Government will provide minutes of this meeting to all participants.

3.2. STAGES OF DESIGN SUBMITTALS AND OVER THE SHOULDER PROGRESS REVIEWS

The stages of design submittals described below define Government expectations with respect to process and content. The Contractor shall determine how to best plan and execute the design and review process for this project, within the parameters listed below. As a minimum, the Government expects to see at least one interim design submittal, at least one final design submittal before construction of a design package may proceed and at least one Design Complete submittal that documents the accepted design. The Contractor may sub-divide the design into separate packages for each stage of design and may proceed with construction of a package after the Government accepts the final design for that package. See discussion on waivers to submission of one or more intermediate design packages where the parties partner during the design process. See also Attachment F, BUILDING INFORMATION MODELING REQUIREMENTS for discussion concerning BIM and the various stages of design submittals and over-the-shoulder progress reviews.

3.2.1. Site/Utilities

To facilitate fast-track design-construction activities the contractor may submit a final (100%) site and utility design as the first design submittal or it may elect to submit interim and final site and utility design submittals as explained below. Following review, resolution, and incorporation of all Government comments, and submittal of a satisfactory set of site/utility design documents, after completing all other pre-construction requirements in this contract and after the pre-construction meeting, the Government will allow the Contractor to proceed with site development activities, including demolition where applicable, within the parameters set forth in the accepted design submittal. For the first site and utility design submission, whether an interim or final, the submittal review, comment, and resolution times from this specification apply, except that the Contractor shall allow the Government a 14 calendar day review period, exclusive of mailing time. No on-site construction activities shall begin prior to written Government clearance to proceed.

3.2.2. Interim Design Submittals

The Contractor may submit either a single interim design for review, representing a complete package with all design disciplines, or split the interim design into smaller, individual design packages as it deems necessary for fast-track construction purposes. As required in Section 01 32 01.00 10 PROJECT SCHEDULE, the Contractor shall schedule its design and construction packaging plan to meet the contract completion period. This submission is the Government's primary opportunity to review the design for conformance to the solicitation and to the accepted contract proposal and to the Building Codes at a point where required revisions may be still made, while minimizing lost design effort to keep the design on track with the contract requirements. The requirements for the interim design review submittals and review conferences are described hereinafter. This is not necessarily a hold point for the design process; the Contractor may designate the interim design submittal(s) as a snapshot and proceed with design development at its own risk. See below for a waiver, where the parties establish an effective over-the-shoulder progress review procedure through the partnering process that would eliminate the need for or expedite a formal intermediate design review on one or more individual design packages.

3.2.3. Over-the-Shoulder Progress Reviews

To facilitate a streamlined design-build process, the Government and the Contractor may agree to one-on-one reviewer or small group reviews, electronically, on-line (if available within the Contractor's standard design practices) or at the Contractor's design offices or other agreed location, when practicable to the parties. The Government and Contractor will coordinate such reviews to minimize or eliminate disruptions to the design process. Any data required for these reviews shall normally be provided in electronic format, rather than in hard copy. If the Government and Contractor establish and implement an effective, mutually agreeable partnering procedure for regular (e.g., weekly) over-the-shoulder review procedures that allow the Government reviewers the opportunity to keep fully informed of the progress, contents, design intent, design documentation, etc. of the design package, the Government will agree to waive or to expedite the formal intermediate design review period for that package. The Contractor shall still be required to submit the required intermediate design documentation, however the parties may agree to how that material will be provided, in lieu of a formal consolidated submission of the package. It should be noted that Government funding is extremely limited for non-local travel by design reviewers, so the maximum use of virtual teaming methods must be used. Some possible examples include electronic file sharing, interactive software with on-line or telephonic conferencing, televideo conferencing, etc. The Government must still perform its Code and Contract conformance reviews, so the Contractor is encouraged to partner with the reviewers to find ways to facilitate this process and to facilitate meeting or bettering the design-build schedule. The Contractor shall maintain a fully functional configuration management system as described herein to track design revisions, regardless of whether or not there is a need for a formal intermediate design review. The formal intermediate

review procedures shall form the contractual basis for the official schedule, in the event that the partnering process determines that the formal intermediate review process to be best suited for efficient project execution. However, the Government pledges to support and promote the partnering process to work with the Contractor to find ways to better the design schedule.

3.2.4. Final Design Submissions

This submittal is required for each design package prior to Government acceptance of that design package for construction. The requirements for the final design submittal review conferences and the Government's acceptance for start of construction are described herein after.

3.2.5. Design Complete Submittals

After the final design submission and review conference for a design package, revise the design package to incorporate the comments generated and resolved in the final review conferences, perform and document a back-check review and submit the final, design complete documents, which shall represent released for construction documents. The requirements for the design complete submittals are described hereinafter.

3.2.6. Holiday Periods for Government Review or Actions

Do not schedule meetings, Government reviews or responses during the last two weeks of December or other designated Government Holidays (including Friday after Thanksgiving). Exclude such dates and periods from any durations specified herein for Government actions.

3.2.7. Late Submittals and Reviews

If the Contractor cannot meet its scheduled submittal date for a design package, it must revise the proposed submittal date and notify the government in writing, at least one (1) week prior to the submittal, in order to accommodate the Government reviewers' other scheduled activities. If a design submittal is over one (1) day late in accordance with the latest revised design schedule, or if notification of a proposed design schedule change is less than seven (7) days from the anticipated design submission receipt date, the Government review period may be extended up to seven (7) days due to reviewers' schedule conflicts. If the Government is late in meeting its review commitment and the delay increases the Contractor's cost or delays completion of the project, the Suspension of Work and Defaults clauses provide the respective remedy or relief for the delay.

3.3. DESIGN CONFIGURATION MANAGEMENT

3.3.1. Procedures

Develop and maintain effective, acceptable design configuration management (DCM) procedures to control and track all revisions to the design documents after the Interim Design Submission through submission of the As-Built documents. During the design process, this will facilitate and help streamline the design and review schedule. After the final design is accepted, this process provides control of and documents revisions to the accepted design (See Special Contract Requirement: Deviating From the Accepted Design). The system shall include appropriate authorities and concurrences to authorize revisions, including documentation as to why the revision must be made. The DCM data shall be available to the Government reviewers at all times. The Contractor may use its own internal system with interactive Government concurrences, where necessary or may use the Government's "DrChecks Design Review and Checking System" (see below and Attachment C).

3.3.2. Tracking Design Review Comments

Although the Contractor may use its own internal system for overall design configuration management, the Government and the Contractor shall use the DrChecks Design Review and Checking System to initiate, respond to, resolve and track Government design compliance review comments. This system may be useful for other data which needs to be interactive or otherwise available for shared use and retrieval. See Attachment C for details on how to establish an account and set-up the DrChecks system for use on the project.

3.3.3. Design and Code Checklists

Develop and complete various discipline-specific checklists to be used during the design and quality control of each submittal. Submit these completed checklists with each design submittal, as applicable, as part of the project documentation. See Section 01 45 04.00 10 Contractor Quality Control, Attachment D for a Sample Fire Protection and Life Safety Code review checklist and Attachment E for LEED SUBMITTALS.

3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

3.4.1. General

At least one interim design submittal, review and review conference is required for each design package (except that, per paragraph 3.2.1, the Contractor may skip the interim design submission and proceed directly to final design on the sitework and utilities package). The DB Contractor may include additional interim design conferences or over-the-shoulder reviews, as needed, to assure continued government concurrence with the design work. Include the interim submittal review periods and conferences in the project schedule and indicate what part of the design work is at what percentage of completion. The required interim design conferences shall be held when interim design requirements are reached as described below. See also Paragraph: **Over-the-Shoulder Progress Reviews** for a waiver to the formal interim design review.

3.4.2. Procedures

After receipt of an Interim Design submission, allow the Government fourteen (14) calendar days after receipt of the submission to review and comment on the interim design submittal. For smaller design packages, especially those that involve only one or a few separate design disciplines, the parties may agree on a shorter review period or alternative review methods (e.g., over-the-shoulder or electronic file sharing), through the partnering process. For each interim design review submittal, the COR will furnish, to the Contractor, a single consolidated, validated listing of all comments from the various design sections and from other concerned agencies involved in the review process using the DrChecks Design Review and Checking System. The review will be for conformance with the technical requirements of the solicitation and the Contractor's RFP proposal. If the Contractor disagrees technically with any comment or comments and does not intend to comply with the comment, he/she must clearly outline, with ample justification, the reasons for noncompliance within five (5) days after receipt of these comments in order that the comment can be resolved. Furnish disposition of all comments, in writing, through DrChecks. The Contractor is cautioned that if it believes the action required by any comment exceeds the requirements of this contract, that it should take no action and notify the COR in writing immediately. The Interim Review conference will be held for each design submittal at the installation. Bring the personnel that developed the design submittal to the review conference. The conference will take place the week after the receipt of the comments by the Contractor. For smaller fast-track packages that involve only a few reviewers, the parties may agree to alternative conferencing methods, such as teleconferencing, or televideo, where available, as determined through Partnering.

3.4.3. Conference Documentation

3.4.3.1. In order to facilitate and accelerate the Government code and contract conformance reviews, identify, track resolution of and maintain all comments and action items generated during the design process and make this available to the designers and reviewers prior to the Interim and subsequent design reviews.

3.4.3.2. The DB Contractor shall prepare meeting minutes and enter final resolution of all comments into DrChecks. Copies of comments, annotated with comment action agreed on, will be made available to all parties before the conference adjourns. Unresolved problems will be resolved by immediate follow-on action at the end of conferences. Incorporate valid comments. The Government reserves the right to reject design document submittals if comments are significant. Participants shall determine if any comments are critical enough to require further design development prior to government concurrence. Participants shall also determine how to proceed in order to obtain government concurrence with the design work presented.

3.5. INTERIM DESIGN REQUIREMENTS

Interim design deliverables shall include drawings, specifications, and design analysis for the part of design that the Contractor considers ready for review.

3.5.1. Drawings

Include comments from any previous design conferences incorporated into the documents to provide an interim design for the "part" submitted.

3.5.2. Design Analyses

3.5.2.1. The designers of record shall prepare and present design analyses with calculations necessary to substantiate and support all design documents submitted. Address design substantiation required by the applicable codes and references and pay particular attention to the following listed items:

3.5.2.2. For parts including sitework, include site specific civil calculations.

3.5.2.3. For parts including structural work, include structural calculations.

- (a) Identify all loads to be used for design.
- (b) Describe the method of providing lateral stability for the structural system to meet seismic and wind load requirements. Include sufficient calculations to verify the adequacy of the method.
- (c) Provide calculations for all principal roof, floor, and foundation members and bracing and secondary members.
- (d) Provide complete seismic analyses for all building structural, mechanical, electrical, architectural, and building features as dictated by the seismic zone for which the facility is being constructed.
- (e) Computer generated calculations must identify the program name, source, and version. Provide input data, including loads, loading diagrams, node diagrams, and adequate documentation to illustrate the design. The schematic models used for input must show, as a minimum, nodes/joints, element/members, materials/properties, and all loadings, induced settlements/deflections, etc., and a list of load combinations. Include an output listing for maximum/minimum stresses/forces and deflections for each element and the reactions for each loading case and combination.
- (f) See also the Security (Anti-Terrorism) requirements below for members subject to Anti-Terrorist Force Protection (ATFP) and Progressive Collapse requirements.
- (g) Fully coordinate and integrate the overall structural design between two different or interfacing construction types, such as modular and stick-built or multistory, stacked modular construction. Provide substantiation of structural, consolidation/settlement analysis, etc., as applicable, through the interfaces.

3.5.2.4. For Security (Anti-Terrorism): Provide a design narrative and calculations where applicable, demonstrating compliance with each of the 22 standards in UFC 4-010-01, which includes Design of Buildings to Resist Progressive Collapse (use the most recent version of UFC 4-023-03, regardless of references to any specific version in UFC 4-010-01). Where sufficient standoff distance is not being provided, show calculations for blast resistance of the structural system and building envelope. Show complete calculations for members subjected to ATFP loads, e.g., support members of glazed items (jambes, headers, sills) connections of windows to support members and connections of support members to the rest of the structure. For 3 story and higher buildings, provide calculations to demonstrate compliance with progressive collapse requirements.

3.5.2.5. For parts including architectural work, include building floor area analysis.

3.5.2.6. For parts including mechanical work, include HVAC analysis and calculations. Include complete design calculations for mechanical systems. Include computations for sizing equipment, compressed air systems, air duct design, and U-factors for ceilings, roofs and exterior walls and floors. Contractor shall employ commercially available energy analysis techniques to determine the energy performance of all passive systems and features. Use of hourly energy load computer simulation is required (see paragraph 3.5.5.2 for list of acceptable software). Based on the results of calculations, provide a complete list of the materials and equipment proposed with the manufacturer's published cataloged product installation specifications and roughing-in data.

3.5.2.7. For parts including life safety, include building code analysis and sprinkler and other suppression systems. Notwithstanding the requirements of the Codes, address the following:

- (a) A registered fire protection engineer (FPE) must perform all fire protection analyses. Provide the fire protection engineer's qualifications. See Section 01 10 00, paragraph 5 for qualifications.

- (b) Provide all references used in the design including Government design documents and industry standards used to generate the fire protection analysis.
- (c) Provide classification of each building in accordance with fire zone, building floor areas and height and number of stories.
- (d) Provide discussion and description of required fire protection requirements including extinguishing equipment, detection equipment, alarm equipment and water supply. Alarm and detection equipment shall interface to requirements of Electronic Systems.
- (e) Provide hydraulic calculations based on water flow test for each sprinkler system to insure that flow and pressure requirements can be met with current water supply. Include copies of Contractor's water flow testing done to certify the available water source.

3.5.2.8. For parts including plumbing systems:

- (a) List all references used in the design.
- (b) Provide justification and brief description of the types of plumbing fixtures, piping materials and equipment proposed for use.
- (c) Detail calculations for systems such as sizing of domestic hot water heater and piping; natural gas piping; LP gas piping and tanks, fuel oil piping and tanks, etc., as applicable.
- (d) When the geotechnical report indicates expansive soils are present, indicate in the first piping design submittal how piping systems will be protected against damage or backfall/backflow due to soil heave (from penetration of slab to the 5 foot building line).

3.5.2.9. For elevator systems:

- (a) List all criteria codes, documents and design conditions used.
- (b) List any required permits and registrations for construction of items of special mechanical systems and equipment.

3.5.2.10. For parts including electrical work, include lighting calculations to determine maintained foot-candle levels, electrical load analysis and calculations, electrical short circuit and protective device coordination analysis and calculations and arc fault calculations.

3.5.2.11. For parts including telecommunications voice/data (including SIPRNET, where applicable), include analysis for determining the number and placement of outlets

3.5.2.12. For Cathodic Protection Systems, provide the following stamped report by the licensed corrosion engineer or NACE specialist with the first design submission. The designer must be qualified to engage in the practice of corrosion control of buried or submerged metallic surfaces. He/she must be accredited or certified by the National Association of Corrosion Engineers (NACE) as a NACE Accredited Corrosion Specialist or a NACE certified Cathodic Protection Specialist, or must be a registered professional engineer with a minimum of five years experience in corrosion control and cathodic protection. Clearly describe structures, systems or components in soil or water to be protected. Describe methods proposed for protection of each.

3.5.3. Geotechnical Investigations and Reports:

3.5.3.1. The contractor's licensed geotechnical engineer shall prepare a final geotechnical evaluation report, to be submitted along with the first foundation design submittal. Make this information available as early as possible during the over-the-shoulder progress review process. Summarize the subsurface conditions and provide recommendations for the design of appropriate utilities, foundations, floor slabs, retaining walls, embankments, and pavements. Include compaction requirements for fill and backfill under buildings, sidewalks, other structures and open areas. Recommend foundation systems to be used, allowable bearing pressures for footings, lateral load resistance capacities for foundation systems, elevations for footings, grade beams, slabs, etc. Provide an assessment of post-construction settlement potential including total and differential. Provide recommendations regarding lateral earth pressures (active, at-rest, passive) to be used in the design of retaining walls. Include the recommended spectral accelerations and Site Class for seismic design along with an evaluation of any seismic hazards and recommendations for mitigation, if required. Include calculations to support the recommendations for bearing capacity, settlement, and pavement sections. Include supporting documentation for all recommended

design parameters such as Site Class, shear strength, earth pressure coefficients, friction factors, subgrade modulus, California Bearing Ratio (CBR), etc. Provide earthwork recommendations, expected frost penetration, expected groundwater levels, recommendations for dewatering and groundwater control and the possible presence of any surface or subsurface features that may affect the construction of the project such as sinkholes, boulders, shallow rock, old fill, old structures, soft areas, or unusual soil conditions. Include pH tests, salinity tests, resistivity measurements, etc., required to design corrosion control and grounding systems. Include the raw field data. Arrange a meeting with the Government subsequent to completion and evaluation of the site specific geotechnical exploration to outline any differences encountered that are inconsistent with the Government provided preliminary soils information. Clearly outline differences which require changes in the foundation type, or pavement and earthwork requirements from that possible and contemplated using the Government furnished preliminary soils investigation, which result in a change to the design or construction. Any equitable adjustment is subject to the provisions of the contract's Differing Site Conditions Clause.

3.5.3.2. Vehicle Pavements: The Contractor's geotechnical report shall contain flexible and rigid pavement designs, as applicable for the project, including design CBR and modulus of subgrade reaction and the required compaction effort for subgrades and pavement layers. Provide Information on the types of base course materials available in the area and design strengths.

3.5.3.3. The Contractor and the professional geotechnical engineer consultant shall certify in writing that the design of the project has been developed consistent with the Contractor's final geotechnical report. The certification shall be stamped by the consulting professional geotechnical engineer and shall be submitted with the first design submission. If revisions are made to the initial design submission, a new certification shall be provided with the final design submission.

3.5.4. LEED Documentation:

Assign a LEED Accredited Professional, responsible to track LEED planning, performance and documentation for each LEED credit through construction closeout. Incorporate LEED credits in the plans, specifications and design analyses. Develop LEED supporting documentation as a separable portion of the Design Analysis and provide with each required design submittal. Include the LEED Project checklist for each non-exempt facility (one checklist may be provided for multiple facilities in accordance with the LEED-NC Application Guide for Multiple Buildings and On-Campus Building Projects and the LEED SUBMITTALS (Attachment E, herein) with each submittal. Final design submittal for each portion of the work must include all required design documentation relating to that portion of work (example - all site credit design documents with final site design). Submittal requirements are as indicated in Attachment E, LEED SUBMITTALS. Submit all documentation indicated on Attachment E as due at final design at final design submittal (for fast-track projects with multiple final design submittals, this shall be at the last scheduled final design submittal). All project documentation related to LEED shall conform to USGBC requirements for both content and format, including audit requirements and be separate from other design analyses. Maintain and update the LEED documentation throughout project progress to construction closeout and shall compile product data, receipts, calculations and other data necessary to substantiate and support all credits claimed. The Government may audit any or all individual credits. Audit documentation is not required to be submitted unless requested. These requirements apply to all projects. If the project requires the Contractor to obtain USGBC certification, the Contractor shall also be responsible for obtaining USGBC certification and shall provide written evidence of certification with the construction closeout LEED documentation submittal. Install the USGBC building plaque at the location indicated by the Government upon receipt. If Contractor obtains USGBC interim design review, submit the USGBC review to the Government within 30 days of receipt for information only.

3.5.4.1. LEED Documentation for Technology Solution Set. If the Solicitation provides a Prescriptive Technology Solution Set, use of the Technology Solution set has no effect on LEED documentation requirements. Provide all required LEED documentation, including energy analysis, in accordance with LEED requirements when using the Technology Solution Set.

3.5.5. Energy Conservation:

3.5.5.1. Refer to Section 01 10 00, Paragraph 5. Interim and Final Design submittals shall demonstrate that each building including the building envelope, HVAC systems, service water heating, power, and lighting systems meet the Mandatory Provisions and the Prescriptive Path requirements of ASHRAE 90.1. Use Compliance Documentation forms available from ASHRAE and included in the ASHRAE 90.1 User's Manual for this purpose. The Architectural Section of the Design Analysis shall include completed forms titled "Building Envelope

Compliance Documentation Parts I and II". The Heating Ventilating and Air Conditioning (HVAC) Section of the Design Analysis shall include a completed form titled "HVAC Simplified Approach Option - Part I" if this approach is allowed by the Standard. Otherwise, the HVAC Section of the Design Analysis shall include completed forms titled "HVAC Mandatory Provisions - Part II" and "HVAC Prescriptive Requirements - Part III". The Plumbing Section of the Design Analysis shall include a completed form titled "Service Water Heating Compliance Documentation". The Electrical Section of the Design Analysis shall include an explanatory statement on how the requirements of ASHRAE 90.1-2004 Chapter 8 Power were met. The Electrical Section of the Design Analysis shall also include a completed form titled "Lighting Compliance Documentation".

3.5.5.2. Interim and Final Design submittals which address energy consuming systems, (heating, cooling, service hot water, lighting, power, etc.) must also include calculations in a separate Energy Conservation Section of the Design Analysis which demonstrate and document (a) the baseline energy consumption for the facility or facilities under contract, that would meet the requirements of ANSI/ASHRAE/IESNA Standard 90.1 and (b) the energy consumption of the facility or facilities under contract utilizing the materials and methods required by this construction contract. Use the USGBC Energy and Atmosphere (EA) Credit 1 compliance template / form or an equivalently detailed form for documenting compliance with the energy reduction requirements. This template / form is titled PERFORMANCE RATING METHOD and is available when the project is registered for LEED. The calculation methodology used for this documentation and analysis shall follow the guidelines set forth in Appendix G of ASHRAE 90.1, with two exceptions: a) receptacle and process loads may be omitted from the calculation; and b) the definition of the terms in the formula for Percentage Improvement found in paragraph G1.2 are modified as follows: Baseline Building Performance shall mean the annual energy consumption calculated for a building design intended for use as a baseline for rating above standard design meeting the minimum requirements of the energy standard, and Proposed Building Performance shall mean annual energy consumption calculated for the proposed building design intended for construction. This calculation shall address all energy consuming systems in a single integrated methodology. Include laboratory fume hoods and kitchen ventilation loads in the energy calculation. They are not considered process loads. Individual calculations for heating, cooling, power, lighting, power, etc. systems will not be acceptable. The following building simulation software is acceptable for use in calculating building energy consumption: Hourly Analysis Program (HAP) by Carrier Corp., TRACE 700 by Trane Corp., DOE-2 by US Department of Energy, EnergyPlus by DOD/DOE.

3.5.6. Specifications

Specifications may be any one of the major, well known master guide specification sources (use only one source) such as MASTERSPEC from the American Institute of Architects, SPECTEXT from Construction Specification Institute or Unified Facility Guide Specifications (UFGS using MASTERFORMAT 2004 numbering system), etc. (including specifications from these sources). Manufacturers' product specifications, utilizing CSI's Manu-Spec, three part format may be used in conjunction with the selected specifications. The designers of record shall edit and expand the appropriate Specifications to insure that all project design requirements, current code requirements, and regulatory requirements are met. Specifications shall clearly identify, where appropriate, specific products chosen to meet the contract requirements (i.e., manufacturers' brand names and model numbers or similar product information).

3.5.7. Building Rendering

Present and provide a draft color computer, artist, or hand drawn rendering with the conceptual design submittal of the building exterior. Perspective renderings shall include a slightly overhead view of the entire building to encompass elevations and the roof configuration of the building. After Government review and acceptance, provide a final rendering, including the following:

Three (3) 18" x 24" color prints, framed and matted behind glass with project title underneath the print.

One (1) Image file (high resolution) in JPG format on CD for those in the submittal distribution list.

3.5.8. Interim Building Design Contents

The following list represents what the Government considers should be included in the overall completed design for a facility or project. It is not intended to limit the contractor from providing different or additional information as needed to support the design presented, including the require design analyses discussed above. As the Contractor develops individual design packages and submits them for Interim review, include as much of the applicable

information for an individual design package as is developed at the Interim design level for review purposes. These pieces shall be developed as the design progresses toward the design complete stage.

3.5.8.1. Lawn and Landscaping Irrigation System

3.5.8.2. Landscape, Planting and Turfing

3.5.8.3. Architectural

- (a) Design Narrative
- (b) Architectural Floor Plans, Typical Wall and Roof Sections, Elevations
- (c) Finish schedule
- (d) All required equipment
- (e) Special graphics requirements
- (f) Door and Window Schedules
- (g) Hardware sets using BHMA designations
- (h) Composite floor plan showing all pre-wired workstations
- (i) Structural Interior Design (SID) package: See ATTACHMENT A for specific requirements
- (j) Furniture, Fixtures & Equipment (FF&E) design package: See ATTACHMENT B for specific requirements

3.5.8.4. Structural Systems. Include:

- (a) Drawings showing principal members for roof and floor framing plans as applicable
- (b) Foundation plan showing main foundation elements where applicable
- (c) Typical sections for roof, floor, and foundation conditions

3.5.8.5. Plumbing Systems

- (a) Show locations and general arrangement of plumbing fixtures and major equipment
- (b) Plan and isometric riser diagrams of all areas including hot water, cold water, waste and vent piping. Include natural gas (and meter as required), (natural gas and meter as required), (LP gas), (fuel oil) and other specialty systems as applicable.
- (c) Include equipment and fixture connection schedules with descriptions, capacities, locations, connection sizes and other information as required

3.5.8.6. HVAC Systems

- (a) Mechanical Floor Plans: The floor plans shall show all principle architectural features of the building which will affect the mechanical design. The floor plans shall also show the following:
 - (1) Room designations.
 - (2) Mechanical legend and applicable notes.
 - (3) Location and size of all ductwork and piping.
 - (4) Location and capacity of all terminal units (i.e., registers, diffusers, grilles, hydronic baseboards).
 - (5) Pre-Fabricated Paint Spray Booth (where applicable to project scope)
 - (6) Paint Preparation Area (where applicable to project scope)
 - (7) Exhaust fans and specialized exhaust systems.
 - (8) Thermostat location.
 - (9) Location of heating/cooling plant (i.e., boiler, chiller, cooling tower, etc).
 - (10) Location of all air handling equipment.

- (11) Air balancing information.
- (12) Flue size and location.
- (13) Piping diagram for forced hot water system (if used).
- (b) Equipment Schedule: Provide complete equipment schedules. Include:
 - (1) Capacity
 - (2) Electrical characteristics
 - (3) Efficiency (if applicable)
 - (4) Manufacturer's name
 - (5) Optional features to be provided
 - (6) Physical size
 - (7) Minimum maintenance clearances
- (a) Details: Provide construction details, sections, elevations, etc., only where required for clarification of methods and materials of design.
- (b) HVAC Controls: Submit complete HVAC controls equipment schedules, sequences of operation, wiring and logic diagrams, Input/Output Tables, equipment schedules, and all associated information. See the Statement of Work for additional specific requirements.

3.5.8.7. Fire Protection and Life Safety.

- (a) Provide plan for each floor of each building that presents a compendium of the total fire protection features being incorporated into the design. Include the following types of information:
 - (1) The location and rating of any fire-resistive construction such as occupancy separations, area separations, exterior walls, shaft enclosures, corridors, stair enclosures, exit passageways, etc.
 - (2) The location and coverage of any fire detection systems
 - (3) The location and coverage of any fire suppression systems (sprinkler risers, standpipes, etc.)
 - (4) The location of any other major fire protection equipment
 - (5) Indicate any hazardous areas and their classification
 - (6) Schedule describing the internal systems with the following information: fire hazard and occupancy classifications, building construction type, GPM/square foot sprinkler density, area of operation and other as required
- (b) Working plans and all other materials submitted shall meet NFPA 13 requirements, with respect to required minimum level of detail.

3.5.8.8. Elevators. Provide:

- (a) Description of the proposed control system
- (b) Description, approximate capacity and location of any special mechanical equipment for elevators.

3.5.8.9. Electrical Systems.

- (a) Electrical Floor Plan(s): Show all principle architectural features of the building which will affect the electrical design. Show the following:
 - (1) Room designations.
 - (2) Electrical legend and applicable notes.
 - (3) Lighting fixtures, properly identified.
 - (4) Switches for control of lighting.
 - (5) Receptacles.

- (6) Location and designation of panelboards. Clearly indicate type of mounting required (flush or surface) and reflect accordingly in specifications.
- (7) Service entrance (conduit and main disconnect).
- (8) Location, designation and rating of motors and/or equipment which requires electrical service. Show method of termination and/or connection to motors and/or equipment. Show necessary junction boxes, disconnects, controllers (approximate only), conduit stubs, and receptacles required to serve the motor and/or equipment.
- (b) Building Riser Diagram(s) (from pad-mounted transformer to unit load center panelboard): Indicate the types and sizes of electrical equipment and wiring. Include grounding and metering requirements.
- (c) Load Center Panelboard Schedule(s): Indicate the following information:
 - (1) Panelboard Characteristics (Panel Designation, Voltage, Phase, Wires, Main Breaker Rating and Mounting.
 - (2) Branch Circuit Designations.
 - (3) Load Designations.
 - (4) Circuit Breaker Characteristics. (Number of Poles, Trip Rating, AIC Rating)
 - (5) Branch Circuit Connected Loads (AMPS).
 - (6) Special Features
- (d) Lighting Fixture Schedule(s): Indicate the following information:
 - (1) Fixture Designation.
 - (2) General Fixture Description.
 - (3) Number and Type of Lamp(s).
 - (4) Type of Mounting.
 - (5) Special Features.
- (e) Details: Provide construction details, sections, elevations, etc. only where required for clarification of methods and materials of design.

3.5.8.10. Electronic Systems including the following responsibilities:

- (a) Fire Detection and Alarm System. Design shall include layout drawings for all devices and a riser diagram showing the control panel, annunciator panel, all zones, radio transmitter and interfaces to other systems (HVAC, sprinkler, etc.)
- (b) Fire Suppression System Control. Specify all components of the Fire Suppression (FS) System in the FS section of the specifications. Clearly describe how the system will operate and interact with other systems such as the fire alarm system. Include a riser diagram on the drawings showing principal components and interconnections with other systems. Include FS system components on drawing legend. Designate all components shown on floor plans "FS system components" (as opposed to "Fire Alarm components"). Show location of FS control panels, HVAC control devices, sensors, and 120V power panel connections on floor plans. Indicate zoning of areas by numbers (1, 2, 3) and detectors sub-zoned for cross zoning by letter designations (A and B). Differentiate between ceiling mounted and under floor detectors with distinct symbols and indicate sub-zone of each.
- (c) Public Address System
- (d) Special Grounding Systems. Completely reflect all design requirements in the specifications and drawings. Specifications shall require field tests (in the construction phase), witnessed by the Government, to determine the effectiveness of the grounding system. Include drawings showing existing construction, if any.
- (e) Cathodic Protection.
- (f) Intrusion Detection, Card Access System
- (g) Central Control and Monitoring System
- (h) Mass Notification System
- (i) Electrical Power Distribution Systems

3.5.8.11. Separate detailed Telecommunications drawings for Information Systems including the following responsibilities:

(a) Telecommunications Cabling

(b) Supporting Infrastructure

(a) Outside Plant (OSP) Cabling - Campus or Site Plans - Exterior Pathways and Inter-Building Backbones

(a) Include a layout of the voice/data outlets (including voice only wall & pay phones) on telecommunication floor plan drawing, location of SIPRNET data outlets (where applicable), and a legend and symbol definition to indicate height above finished floor. Show size of conduit and cable type and size on Riser Diagram. Do not show conduit runs between backboard and outlets on the floor plans. Show underground distribution conduit and cable with sizing from point of presence to entrance facility of building.

(b) Layout of complete building per floor - Serving Zone Boundaries, Backbone Systems, and Horizontal Pathways including Serving Zones Drawings - Drop Locations and Cable ID's

(c) Communication Equipment Rooms - Plan Views - Tech and AMEP/Elevations - Racks and Walls. Elevations with a detailed look at all telecomm rooms. Indicate technology layout (racks, ladder-racks, etc.), mechanical/electrical layout, rack elevation and backboard elevation. They may also be an enlargement of a congested area of T1 or T2 series drawing.

3.6. FINAL DESIGN REVIEWS AND CONFERENCES

A final design review and review conference will be held upon completion of final design at the project installation, or – where equipment is available - by video teleconference or a combination thereof, for any design package to receive Government acceptance to allow release of the design package for construction. For smaller separate design packages, the parties may agree on alternative reviews and conferences (e.g., conference calls and electronic file sharing, etc.) through the Partnering process. Include the final design conference in the project schedule and shall indicate what part of the design work is at 100% completion. The final design conference will be held after the Government has had seven (7) calendar days after receipt of the submission to review the final design package and supporting data. For smaller packages, especially those involving only one or a few design disciplines the parties may agree on a shorter period.

3.7. FINAL DESIGN REQUIREMENTS

Final design deliverables for a design package shall consist of 100% complete drawings, specifications, submittal register and design analyses for Government review and acceptance. The 100% design submission shall consist of drawings, specifications, updated design analyses and any permits required by the contract for each package submitted. In order to expedite the final design review, prior to the conference, ensure that the design configuration management data and all review comment resolutions are up-to-date. Include the 100% SID and 100% FF&E binders for government approval. The Contractor shall have performed independent technical reviews (ITR's) and back-checks of previous comment resolutions, as required by Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL, including providing documentation thereof. Use DrChecks or other acceptable comment tracking system during the ITR and submit the results with each final design package

3.7.1. Drawings

3.7.1.1. Submit drawings complete with all contract requirements incorporated into the documents to provide a 100% design for each package submitted.

3.7.1.2. Prepare all drawings with the Computer-Aided Design and Drafting (CADD)/Computer-Aided Design (CAD) system, organized and easily referenced electronically, presenting complete construction information.

3.7.1.3. Drawings shall be complete. The Contractor is encouraged to utilize graphics, views, notes, and details which make the drawings easier to review or to construct but is also encouraged to keep such materials to those that are necessary.

3.7.1.4. Provide detail drawings that illustrate conformance with the contract. Include room finish schedules, corresponding color/finish/special items schedules, and exterior finish schedules that agree with the submitted SID binders.

3.7.1.5. The design documents shall be in compliance with the latest version of the A/E/C CAD Standard, available at <https://cadbim.usace.army.mil/CAD>. Use the approved vertical Corps of Engineers title blocks and borders on all drawings with the appropriate firm name included within the title block area.

3.7.1.6. CAD System and Building Information Modeling (BIM) (NOTE: If this is a Single Award or Multiple Award, Indefinite Delivery/Indefinite Quantity Contract, this information will be provided for each task order.)

All CAD files shall be fully compatible with AutoCAD 2000 or higher. Save all design CAD files as AutoCAD 2000 or higher files. All submitted BIM Models and associated Facility Data shall be fully compatible with Bentley BIM file format and the USACE Bentley BIM v8 Workspace.

(a) CAD Data Final File Format: During the design development capture geo-referenced coordinates of all changes made to the existing site (facility footprint, utility line installations and alterations, roads, parking areas, etc) as a result of this contract. There is no mandatory methodology for how the geo-referenced coordinates will be captured, however, Engineering and Construction Bulletin No. 2006-15, Subject: Standardizing Computer Aided Design (CAD) and Geographic Information Systems (GIS) Deliverables for all Military Design and Construction Projects identifies the format for final as-built drawings and data sets to be delivered to the government. Close-out requirements at the as-built stage; require final geo-referenced GIS Database of the new facility along with all exterior modifications. The Government will incorporate this data set into the Installation's GIS Masterplan or Enterprise GIS System. See also, Section 01 78 02.00 10 Closeout Submittals.

(b) Electronic Drawing Files: In addition to the native CAD design files, provide separate electronic drawing files (in editable CAD format and Adobe Acrobat PDF version 7.0 or higher) for each project drawing.

(c) Each file (both CAD and PDF) shall represent one complete drawing from the drawing set, including the date, submittal phase, and border. Each drawing file shall be completely independent of any data in any other file, including fonts and shapes not included with the basic CAD software program utilized. Fonts that are not included as part of the default CAD software package installation or recognized as an allowable font by the A/E/C CAD Standard are not acceptable in delivered CAD files. All displayed graphic elements on all levels of the drawing files shall be part of the project drawing image. The drawing files shall not contain any graphic element that is not part of the drawing image.

(d) Deliver BIM Model and associated Facility Data files in their native format. At a minimum, BIM files shall address major architecture design elements, major structural components, mechanical systems and electrical/communication distribution and elements as defined in Attachment F. See Attachment F for additional BIM requirements.

(e) Drawing Index: Provide an index of drawings sheet in CAD as part of the drawing set, and an electronic list in Microsoft Excel of all drawings on the CD. Include the electronic file name, the sheet reference number, the sheet number, and the sheet title, containing the data for each drawing.

(f) Hard Copies: Plot submitted hard copy drawings directly from the "electronic drawing files" and copy for quantities and sizes indicated in the distribution list at the end of this specification section. The Designers of Record shall stamp, sign and date original hard copy sheets as Released For Construction, and provide copies for distribution from this set.

3.7.2. Design Analyses

3.7.2.1. The designers of record shall update, finalize and present design analyses with calculations necessary to substantiate and support all design documents submitted.

3.7.2.2. The responsible DOR shall stamp, sign and date the design analysis. Identify the software used where, applicable (name, version, vendor). Generally, provide design analyses, individually, in an original (file copy) and one copy for the assigned government reviewer.

3.7.2.3. All disciplines review the LEED design analysis in conjunction with their discipline-specific design analysis; include a copy of the separable LEED design analysis in all design analysis submittals.

3.7.2.4. Do not combine multi-disciplined volumes of design-analysis, unless multiple copies are provided to facilitate multiple reviewers (one copy per each separate design analysis included in a volume).

3.7.3. Specifications

Specifications shall be 100% complete and in final form.

3.7.4. Submittal Register

Prepare and update the Submittal Register and submit it with the 100% design specifications (see Specification Section 01 33 00, SUBMITTAL PROCEDURES) with each design package. Include the required submittals for each specification section in a design package in the submittal register.

3.7.5. Preparation of DD Form 1354 (Transfer of Real Property)

This form itemizes the types, quantities and costs of various equipment and systems that comprise the project, for the purpose of transferring the new construction project from the Corps Construction Division to the Installation's inventory of real property. The Government will furnish the DB Contractor's design manager a DD Form 1354 checklist to use to produce a draft Form 1354. Submit the completed checklist and prepared draft Form DD 1354 with the 100% design in the Design Analysis. The Corps will use these documents to complete the final DD 1354 upon completion of construction.

3.7.6. Acceptance and Release for Construction

3.7.6.1. At the conclusion of the Final Design Review (after resolutions to the comments have been agreed upon between DOR and Government reviewers), the Contracting Officer or the ACO will accept the Final Design Submission for the design package in writing and allow construction to start for that design package. The Government may withhold acceptance until all major corrections have been made or if the final design submission requires so many corrections, even though minor, that it isn't considered acceptably complete.

3.7.6.2. Government review and acceptance of design submittals is for contract conformance only and shall not relieve the Contractor from responsibility to fully adhere to the requirements of the contract, including the Contractor's accepted contract proposal, or limit the Contractor's responsibility of design as prescribed under Special Contract Requirement: "Responsibility of the Contractor for Design" or limit the Government's rights under the terms of the contract. The Government reserves the right to rescind inadvertent acceptance of design submittals containing contract deviations not separately and expressly identified in the submittal for Government consideration and approval.

3.8. DESIGN COMPLETE CONSTRUCTION DOCUMENT REQUIREMENTS

After the Final Design Submission and Review Conference and after Government acceptance of the Final Design submission, revise the design documents for the design package to incorporate the comments generated and resolved in the final review conference, perform and document a back-check review and submit the final, design complete documents. Label the final design complete documents "FOR CONSTRUCTION" or use similar language. In addition to the final drawings and specifications, the following deliverables are required for distribution and field use. The deliverable includes all documentation and supporting design analysis in final form, as well as the final review comments, disposition and the back-check. As part of the quality assurance process, the Government may perform a back-check of the released for construction documentation. Promptly correct any errors or omissions found during the Government back-check. The Government may withhold retainage from progress payments for work or materials associated with a final design package until this submittal has been received and the Government determines that it is complete.

3.9. SUBMITTAL DISTRIBUTION, MEDIA AND QUANTITIES

3.9.1. Submittal Distribution and Quantities

General: The documents which the Contractor shall submit to the Government for each submittal are listed and generally described in preceding paragraphs in this Section. Provide copies of each design submittal and design substantiation as follows (NOTE: If this is a Single Award or Multiple Award, Indefinite Delivery/Indefinite Quantity Contract, this information will be provided for each task order):

Activity and Address	Drawing Size (Full Size) Full-Size Full Sets/ *Partial Sets	Design Analyses & Specs Full Sets/ *Partial Sets	Drawing Size (Half Size) Half-Size Full Sets/ *Partial Sets	Non-BIM Data CD-ROM or DVD as Necessary (PDF& .dwg)	Furniture Submittal (Per Attachment B)	Structural Interior Design Submittal	BIM Data DVD (Per Attach F)
Commander, U.S.Army Engineer District Fort Worth	0/0	3/0	3/0	4	1	1	0
Commander, U.S.Army Engineer District, Center of Standardization Huntsville Center	0/0	1/0	1/0	1	N/A	1	0
Installation	1/0	8/0	11/0	19	2	4	0
U.S.Army Corps of Engineers Construction Area Office	4/0	4/0	4/0	4	1	4	0
Information Systems Engineering Command (ISEC)	0/0	0/1	0/0	1	N/A	N/A	1
Other Offices	0/0	5/0	5/0	7	N/A	5	2

***NOTE: For partial sets of drawings, specifications and design analyses, see paragraph 3.9.3.3, below.**

****NOTE: When specified below in 3.9.2, furnish Installation copies of Drawings as paper copies, in lieu of the option to provide secure web-based submittals.**

3.9.2. Web based Design Submittals

Except for full or half-sized drawings for Installation personnel, as designated in the Table above, Web based design submittals will be acceptable as an alternative to the paper copies listed in the Table above, provided a single hard-copy PDF based record set is provided to the Contracting Officer for record purposes. Where the contract requires the Contractor to submit documents to permitting authorities, still provide those authorities paper copies (or in an alternate format where required by the authority). Web based design submittal information shall be provided with adequate security and availability to allow unlimited access those specifically authorized to Government reviewers while preventing unauthorized access or modification. File sizes must be of manageable size for reviewers to quickly download or open on their computers. As a minimum, drawings shall be full scale on American National Standards Institute (ANSI) D sheets (34" x 22"). In addition to the optional website, provide the BIM data submission on DVD to each activity and address noted above in paragraph 3.9.1 for each BIM submission required in Attachment F.

3.9.3. Mailing of Design Submittals

3.9.3.1. Mail all design submittals to the Government during design and construction, using an overnight mailing service. The Government will furnish the Contractor addresses where each copy shall be mailed to after award of the contract (or individual task order if this is an indefinite delivery/indefinite quantity, task order contract). Mail the submittals to twenty one (21) different addresses. Assemble drawing sheets, specs, design analyses, etc. into individual sets; do not combine duplicate pages from individual sets so that the government has to assemble a set.

3.9.3.2. Each design submittal shall have a transmittal letter accompanying it indicating the date, design percentage, type of submittal, list of items submitted, transmittal number and point of contact with telephone number.

3.9.3.3. Provide partial sets of drawings, specifications, design analyses, etc., as designated in the Table in paragraph 3.9.1, to those reviewers who only need to review their applicable portions of the design, such as the various utilities. The details of which office receives what portion of the design documentation will be worked out after award.

3.10. AS-BUILT DOCUMENTS

Provide as-built drawings and specifications in accordance with Section 01 78 02.00 10, CLOSEOUT SUBMITTALS. Update LEED design phase documentation during construction as needed to reflect construction changes and advancing project completion status (example - Commissioning Plan updates during construction phase) and include updated LEED documentation in construction closeout submittal.

ATTACHMENT A STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS

1.0 GENERAL INFORMATION

Structural Interior Design includes all building related elements and components generally part of the building itself, such as wall finishes, ceilings finishes, floor coverings, marker/bulletin boards, blinds, signage and built in casework. Develop the SID in conjunction with the furniture footprint.

2.0 STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS FOR THE INTERIM AND FINAL DESIGN SUBMITTALS

2.1. FORMAT AND SCHEDULE

Prepare and submit for approval an interior and exterior building finishes scheme for an interim design submittal. The DOR shall meet with and discuss the finish schemes with the appropriate Government officials prior to preparation of the schemes to be presented. Present original sets of the schemes to reviewers at an interim design conference.

At the conclusion of the interim phase, after resolutions to the comments have been agreed upon between DOR and Government reviewers, the Contractor may proceed to final design with the interior finishes scheme presented.

The SID information and samples are to be submitted in 8 ½" x 11" format using three ring binders with pockets on the inside of the cover. When there are numerous pages with thick samples, use more than one binder. Large D-ring binders are preferred to O-ring binders. Use page protectors that are strong enough to keep pages from tearing out. Anchor large or heavy samples with mechanical fasteners, Velcro, or double-faced foam tape rather than rubber cement or glue. Fold out items must have a maximum spread of 25 ½". Provide cover and spine inserts sheets identifying the document as "Structural Interior Design" package. Include the project title and location, project number, Contractor/A/E name and phone number(s), submittal stage and date.

Design submittal requirements include, but are not limited to:

2.1.1. Narrative of the Structural Interior Design Objectives

The SID shall include a narrative that discusses the building related finishes. Include topics that relate to base standards, life safety, sustainable design issues, aesthetics, durability and maintainability, discuss the development and features as they relate to the occupants requirements and the building design.

2.1.2. Interior Color Boards

Identify and key each item on the color boards to the contract documents to provide a clear indication of how and where each item will be used. Arrange finish samples to the maximum extent possible by room type in order to illustrate room color coordination. Label all samples on the color boards with the manufacturer's name, patterns and colors name and number. Key or code samples to match key code system used on contract drawings.

Material and finish samples shall indicate true pattern, color and texture. Provide photographs or colored photocopies of materials or fabrics to show large overall patterns in conjunction with actual samples to show the actual colors. Finish samples must be large enough to show a complete pattern or design where practical.

Color boards shall include but not be limited to original color samples of the following:

All walls finishes and ceiling finishes, including corner guards, acrylic wainscoting and wall guards/chair rail finishes

All tile information, including tile grout color and tile patterns.

- All flooring finishes, including patterns.
- All door, door frame finishes and door hardware finishes
- All signage, wall base, toilet partitions, locker finishes and operable/folding partitions and trim

- All millwork materials and finishes (cabinets, counter tops, etc.)
- All window frame finishes and window treatments (sills, blinds, etc.)

Color board samples shall reflect all actual finish textures, patterns and colors required as specified. Patterned samples shall be of sufficient size to adequately show pattern and its repeat if a repeat occurs.

2.1.3. Exterior Color Boards

Prepare exterior finishes color boards in similar format as the interior finishes color boards, for presentation to the reviewers during an interim design conference. Provide original color samples of all exterior finishes including but not limited to the following:

- All Roof Finishes
- All Brick and Cast Stone Samples
- All Exterior Insulation and Finish Samples
- All Glass Color Samples
- All Exterior Metals Finishes
- All Window & Door Frame Finishes
- All Specialty Item Finishes, including trim

Identify each item on the exterior finishes color boards and key to the building elevations to provide a clear indication of how and where each item will be used.

2.2. STRUCTURAL INTERIOR DESIGN DOCUMENTS

2.2.1. General

Structural interior design related drawings must indicate the placement of extents of SID material, finishes and colors and must be sufficiently detailed to define all interior work. The following is a list of minimum requirements:

2.2.2. Finish Color Schedule

Provide finish color schedule(s) in the contract documents. Provide a finish code, material type, manufacturer, series, and color designations. Key the finish code to the color board samples and drawings.

2.2.3. Interior Finish Plans

Indicate wall and floor patterns and color placement, material transitions and extents of interior finishes.

2.2.4. Furniture Footprint Plans

Provide furniture footprint plans showing the outline of all freestanding and systems furniture for coordination of all other disciplines.

2.2.5. Interior Signage

Include interior signage plans or schedules showing location and quantities of all interior signage. Key each interior sign to a quantitative list indicating size, quantity of each type and signage text.

2.2.6. Interior Elevations, Sections and Details

Indicate material, color and finish placement.

ATTACHMENT B FURNITURE, FIXTURES & EQUIPMENT (FF&E) REQUIREMENTS

1.0 FF&E REQUIREMENTS FOR THE INTERIM AND FINAL DESIGN SUBMITTALS

1.1. FORMAT AND SCHEDULE

Prepare and submit for approval a comprehensive FF&E scheme for an interim design submittal. The Contractor's interior designer, not a furniture dealer, shall develop the design. FF&E is the selection, layout, specification and documentation of furniture includes but is not limited to workstations, seating, tables, storage and shelving, filing, trash receptacles, clocks, framed artwork, artificial plants, and other accessories. Contract documentation is required to facilitate pricing, procurement and installation. The FF&E package is based on the furniture footprint developed in the Structural Interior Design (SID) portion of the interior design. Develop the FF&E package concurrently with the building design to ensure that there is coordination between the electrical outlets, switches, J-boxes, communication outlets and connections, and lighting as appropriate. In addition, coordinate layout with other building features such as architectural elements, thermostats, location of TV's, GF/GI equipment (for example computers, printers, copiers, shredders, faxes), etc. Locate furniture in front of windows only if the top of the item falls below the window and unless otherwise noted, do not attach furniture including furniture systems to the building. If project has SIPRNET and/or NIPRNET, coordinate furniture layout with SIPRNET and NIPRNET separation requirements. Verify that access required by DOIM for SIPRNET box and conduit is provided. The DOR shall interview appropriate Government personnel to determine FF&E requirements for furniture and furnishings prior to preparation of the scheme to be presented. Determine FFE items and quantities by, but not limited to: (1) the number of personnel to occupy the building, (2) job functions and related furniture/office equipment to support the job function, (3) room functions, (4) rank and grade. Present original sets of the scheme to reviewers at an interim design conference upon completion of the interim architectural submittal or three months prior to the submittal of the final FF&E package (whichever comes first).

Design may proceed to final with the FF&E scheme presented at the conclusion of the interim phase, after resolutions to the comments have been agreed upon between DOR and Government reviewers.

Provide six copies of the electronic versions of all documents upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first), to ensure adequate time for furniture acquisition. Provide unbound, electronic drawings in CAD and BIM. Provide all files needed to view complete drawings. Submit all text documents in Microsoft Word or Excel..

Submit four copies of the final and complete FF&E information and samples in 8 1/2" x 11" format using three ring binders with pockets on the inside of the cover upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first). Use more than one binder when there are numerous pages with thick samples. Large D-ring binders are preferred to O-ring binders. Use page protectors that are strong enough to keep pages from tearing out for upholstery and finish boards. Anchor large or heavy samples with mechanical fasteners, Velcro, or double-faced foam tape rather than rubber cement or glue. Fold out items must have a maximum spread of 25 1/2". Provide cover and spine inserts sheets identifying the document as "Furniture, Fixtures & Equipment" package and include the project title and location, project number, Contractor/A/E name and phone number(s), submittal stage and date.

Provide electronic copies of all documents upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first), to ensure adequate time for furniture acquisition. Provide six compact disks with all drawings files needed to view the complete drawings unbound and in the latest version AutoCAD. Provide six additional compact disks of all text documents in Microsoft Word or Excel.

Design submittal requirements include, but are not limited to:

1.1.1. Narrative of Interior Design Objectives

Provide a narrative description of the furniture, to include functional, safety and ergonomic considerations, durability, sustainability, aesthetics, and compatibility with the building design.

1.1.2. Furniture Order Form

Prepare one Furnishings Order Form for each item specified in the design. This form identifies all information required to order each individual item. In addition to the project name and location, project number, and submittal phase, the order form must include:

- (a) Furniture item illustration and code
- (b) Furniture item name
- (c) Job name, location, and date
- (d) General Services Administration (GSA) FSC Group, part, and section
- (e) Manufacturer, Product name and Product model number or National Stock Number (NSN)
- (f) Finish name and number (code to finish samples)
- (g) Fabric name and number, minimum Wyzenbeek Abrasion Test double rubs (code to fabric samples)
- (h) Dimensions
- (i) Item location by room number and room name
- (j) Quantity per room
- (k) Total quantity
- (l) Special instructions for procurement ordering and/or installation (if applicable)
- (m) Written Product Description: include a non-proprietary paragraph listing the salient features of the item to include but not limited to:
 - (1) required features and characteristics
 - (2) ergonomic requirements
 - (3) functional requirements
 - (4) testing requirements
 - (5) furniture style
 - (6) construction materials
 - (7) minimum warranty

The following is an example for “m” features and characteristics, ergonomic requirements and functional requirements:

Chair Description:

- (1) Mid-Back Ergonomic Task Chair
- (2) Pneumatic Gaslift; Five Star Base
- (3) Mesh Back; Upholstered Seat
- (4) Height and Width Adjustable Task Arms:
 - a. Arm Height: 6”- 11” (+-1/2”)
 - b. Arm Width: 2”– 4” adjustment
- (5) Height Adjustable Lumbar Support
- (6) Adjustable Seat Height 16”-21” (+- 1”)
- (7) Sliding Seat Depth Adjustment 15”-18” (+-1”)
- (8) Standard Hard Casters (for carpeted areas)
- (9) Overall Measurements:
 - a. Overall width: 25” - 27”
 - b. Overall depth: 25”– 28”

(10) Must have a minimum of the following adjustments (In addition to the above):

- a. 360 Degree Swivel
- b. Knee-Tilt with Tilt Tension
- c. Back angle
- d. Forward Tilt
- e. Forward Tilt and Upright Tilt Lock

For projects with systems furniture, also provide a written description of the following minimum requirements:

- (1) Type furniture systems (panel, stacking panels, spine wall, desk based system, or a combination)
- (2) Minimum noise reduction coefficient (NRC)
- (3) Minimum sound transfer coefficient (STC)
- (4) Minimum flame spread and smoke development
- (5) UL testing for task lighting and electrical system
- (6) Panel widths and heights and their locations (this may be done on the drawings) Worksurface types and sizes (this may be done on the drawings)
- (7) Worksurface edge type
- (8) Varying panel/cover finish materials and locations (locations may be shown on the drawings)
- (9) Storage requirements
- (10) Keyboard requirements
- (11) Lock and keying requirements
- (12) Accessory components (examples: tack boards, marker boards, paper management)
- (13) Electrical and communication raceway requirement; type, capacity and location (base, beltline, below and/or above beltline)
- (14) Locations of communication cables (base, beltline, below and/or above beltline, top channel)
- (15) Types of electrical outlets
- (16) Types of communication jacks; provided and installed by others
- (17) Locations of electrical outlets and communication jacks (this may be done on the drawings)
- (18) Type of cable (examples: Cat. 5, Cat. 6, fiber optic; UTP or STP, etc.) system needs to support; provided and installed by others

1.1.3. Alternate Manufacturer List

Provide a table consisting of major furniture items that lists the manufacturers products specified on the Order Form and two alternate manufacturers. Major furniture items include, but are not limited to, casegoods, furniture systems, seating, and tables. Organize matrix by item code and item name. Supply alternates that are available on GSA Schedule and meet the requirements of the Furniture Order Form. One of the two alternates must be from UNICOR if possible. Provide manufacturer name address, telephone number, product series and product name for each alternate manufacturer.

1.1.4. FF&E Procurement List

Provide a table that lists all FF&E furniture, mission unique equipment and building Contractor Furnished/Contractor Installed (CF/CI) items. Give each item a code and name and designate whether item will be procured as part of the FF&E furniture, mission unique equipment or the building construction contract. Use the item code to key all FF&E documents including location plans, color boards, data sheets, cost estimate, etc.

1.1.5. Points of Contact (POCs)

Provide a comprehensive list of POCs needed to implement the FF&E package. This would include but not be limited to appropriate project team members, using activity contacts, interior design representatives, construction contractors and installers involved in the project. In addition to name, address, phone, fax and email, include each contact's job function. Divide the FF&E package into different sections based on this listing, applies to order forms and cost estimates.

1.1.6. Color Boards

Provide color boards for all finishes and fabrics for all FF&E items. Finishes to be included but not limited to paint, laminate, wood finish, fabric, etc.

1.1.7. Itemized Furniture Cost Estimate

Provide an itemized cost estimate of furnishings keyed to the plans and specifications of products included in the package. This cost estimate should be based on GSA price schedules. The cost estimate must include separate line items for general contingency, installation, electrical hook-up for systems furniture or other furniture requiring hardwiring by a licensed electrician, freight charges and any other related costs. Installation and freight quotes from vendors should be use in lieu of a percentage allowance when available. Include a written statement that the pricing is based on GSA schedules. An estimate developed by a furniture dealership may be provided as support information for the estimate, but must be separate from the contractor provided estimate.

1.2. INTERIOR DESIGN DOCUMENTS

1.2.1. Overall Furniture and Area Plans

Provide floor Plans showing locations and quantities of all freestanding, and workstation furniture proposed for each floor of the building. Key each room to a large scale Furniture Placement Plan showing the furniture configuration, of all furniture. Provide enlarged area plans with a key plan identifying the area in which the building is located. Key all the items on the drawings by furniture item code. Do not provide manufacturer specific information such as product names and numbers on drawings, Drawings shall be non-proprietary. This is typical for FFE on all plans, including those mentioned below.

1.2.2. Workstation Plans

Show each typical workstation configuration in plan view, elevations or isometric view. Drawings shall illustrate panels and all major components for each typical workstation configuration. Identify workstations using the same numbering system as shown on the project drawings. Key components to a legend on each sheet which identifies and describes the components along with dimensions. Provide the plan, elevations and isometric of each typical workstation together on the same drawing sheet.

1.2.3. Panel Plans

Show panel locations and critical dimensions from finished face of walls, columns, panels including clearances and aisle widths. Key panel assemblies to a legend which shall include width, height, configuration of frames, panel fabric and finishes (if there are different selections existing within a project), powered or non-powered panel and wall mount locations.

1.2.4. Desk Plans

Provide typical free standing desk configurations in plan view, elevation or isometric view and identify components to clearly represent each desk configuration.

1.2.5. Reflected Ceiling Plans

Provide typical plans showing ceiling finishes and heights, lighting fixtures, heating ventilation and air conditioning supply and return, and sprinkler head placement for coordination of furniture.

1.2.6. Electrical and Telecommunication Plans

Show power provisions including type and locations of feeder components, activated outlets and other electrical components. Show locations and quantities of outlets for workstations. Clearly identify different outlets, i.e. electrical, LAN and telecommunication receptacles indicating each type proposed. Show wiring configuration, (circuiting, switching, internal and external connections) and provide as applicable.

1.2.7. Artwork Placement Plans

Provide an Artwork Placement Plan to show location of artwork, assign an artwork item code to each piece of artwork. As an alternative, artwork can be located on the Furniture Plans. Provide a schedule that identifies each piece by room name and number. Provide installation instructions; include mounting height.

1.2.8. Window Drapery Plans

Provide Interior Window Drapery Plans. Key each drapery treatment to a schedule showing color, pattern, material, drapery size and type, draw direction, location and quantities.

1.3. FURNITURE SELECTION

1.3.1. Select furniture from the GSA Schedules. Specify furniture available open market when an item is not available on the GSA Schedules. Provide justification for items not available on the GSA Schedules.

1.3.2. To the greatest extent possible when specifying furniture work within a manufacturer's family of furniture for selections, example: Steelcase, Turnstone, Brayton International, Metro, and Vecta are all Steelcase companies. Each alternate should also be specified from a manufacturer's family of furniture, example: first set of alternates would be specified from Knoll's family of furniture and the second from Herman Miller family of furniture. It may be necessary to make some selections from other than a manufacturer's family of furniture if costs are not reasonable for particular items, some items are not available or appropriate for the facility or the items are not on GSA Schedule. If this occurs, consider specifying product from an open line that is accessible by numerous dealerships. Select office furniture including case goods, tables, storage, seating, etc. that is compatible in style, finish and color. Select furniture that complies with ANSI/BIFMA and from manufacturer's standard product line as shown in the most recent published price list and/or amendment and not custom product.

1.4. CONSTRUCTION

1.4.1. Provide knee space at workstations and tables that is not obstructed by panels/legs that interfere with knee space of seated person and specify modesty panels at walls to be of a height or be hinged to allow access to building wall electrical outlets and communication jacks. Provide desks, storage and tables with leveling devices to compensate for uneven floors.

1.4.2. Specify workstations and storage of steel construction. Provide worksurface tops constructed to prevent warpage. Provide user friendly features such as radius edges. Do not use sharp edges and exposed connections and ensure the underside of desks, tables and worksurfaces are completely and smoothly finished. Provide abutting worksurfaces that mate closely and are of equal heights when used in side-by-side configurations in order to provide a continuous and level worksurface.

1.4.3. Drawers shall stay securely closed when in the closed position and protect wires from damage during drawer operation. Include a safety catch to prevent accidental removal when fully open

1.4.4. Unless otherwise noted, provide lockable desks and workstations, filing cabinets and storage. Key all locks within a one person office the same; key all one person offices within a building differently. If an office or open office area has more than one workstation, key all the workstations differently, but key all locks within an individual workstation the same. Use tempered glass glazing when glazing is required. Use light-emitting diode (LED)/solid state lighting where task lighting is required in furniture.

1.5. FINISHES AND UPHOLSTERY

1.5.1. Specify neutral colors for casegoods, furniture systems, storage and tables. Specify desk worksurfaces and table tops that are not too light or too dark in color and have a pattern to help hide soiling. Accent colors are

allowed in break and lounge areas. Keep placement of furniture systems panel fabric accent colors to a minimum. All finishes shall be cleanable with ordinary household cleaning solutions.

1.5.2. Use manufacturer's standard fabrics; including textile manufacturers fabrics that have been graded into the furniture manufactures fabric grades and are available through their GSA Schedule. Customers Own Material (COM) can be used in headquarter buildings in command suites with executive furniture. Coordinate specific locations with Corps of Engineers Interior Designer.

1.5.3. Specify seating upholstery that meets Wyzenbeek Abrasion Test, 55,000 minimum rubs. Specify a soil retardant finish for woven fabrics if Crypton or vinyl upholstery is not provided for seating in dining areas. Use manufacturer's standard fabrics. This includes textile manufacturers fabrics that have been graded into the furniture manufactures fabric grades and are available through their GSA Schedule. Specify upholstery and finish colors and patterns that help hide soiling. Specify finishes that can be cleaned with ordinary household cleaning solutions.

1.6. ACCESSORIES

1.6.1. Specify all accessories required for completely finished furniture installation. Provide filing cabinets and storage for office supplies. Provide tack surfaces at workstations with overhead storage. Provide tackable surfaces at workstations with overhead storage.

1.6.2. Not Used.

1.6.3. Workstations are to be equipped with stable keyboard trays that have height adjustability, tilting capability, including negative tilt, have a mouse pad at same height as the keyboard tray that can accommodate both left and right handed users, and retractable under worksurface.

1.7. MISSION UNIQUE EQUIPMENT

Funding for FF&E furniture items and mission unique equipment (MUE) items are from two different sources. Separate the designs and procurement documentation for FFE items and MUE. MUE includes, but is not limited to, items such as industrial shelving, workbenches, appliances, fitness equipment, IT equipment and supporting carts. The User will purchase and install mission unique equipment items, unless otherwise noted. Identify locations of known MUE items such as industrial shelving, workbenches, appliances, etc. for space planning purposes.

1.8. SUSTAINABILITY

1.8.1. For all designs provided regardless of facility type, make every effort to implement all aspects of sustainability to the greatest extent possible for all the selections made in the FF&E package. This includes but is not limited to the selection of products that consider: **Material Chemistry and Safety of Inputs** (What chemicals are used in the construction of the selections?); **Recyclability** (Do the selections contain recycled content?); **Disassembly** (Can the selections be disassembled at the end of their useful life to recycle their materials?).

1.8.2. Make selections to the greatest extent possible of products that possess current McDonough Braungart Design Chemistry ([MBDC](#)) certification or other "third-party" certified Cradle to Cradle program, Forest Stewardship Council (FSC) certification, GREENGAURD certification or similar "third-party" certified products consisting of low-emitting materials.

1.9. FURNITURE SYSTEMS

1.9.1. General.

Where appropriate, design furniture systems in open office areas. Coordinate style and color of furniture systems with other storage, seating, etc. in open office areas. Minimize the number of workstation typicals and the parts and pieces required for the design to assist in future reconfiguration and inventorying.

1.9.2. Connector Systems.

Specify a connector system that allows removal of a single panel or spine wall within a typical workstation configuration without requiring disassembly of the workstation or removal of adjacent panels. Specify connector

system with tight connections and continuous visual seals. When Acoustical panels are used, provide connector system with continuous acoustical seals. Specify concealed clips, screws, and other construction elements, where possible.

1.9.3. Panels and Spine Walls

Specify panels and spine walls with hinged or removable covers that permit easy access to the raceway when required but are securely mounted and cannot be accidentally dislodged under normal conditions. Panels shall be capable of structurally supporting more than 1 fully loaded component per panel per side. Raceways are to be an integral part of the panel and must be able to support lay-in cabling and have a large capacity for electrical and IT. Do not thread cables through the frame.

1.9.4. Electrical And Information/Technology (IT)

Design furniture with electrical systems that meets requirements of UL 1286 when powered panels are required and UL approved task lights that meet requirements of NFPA 70. Dependent on user requirements and Section 01 10 00, paragraph 3 requirements, it is recommended that workstation electrical and IT wiring entry come from the building walls to eliminate the use of power poles and access at the floor. Design electrical and IT systems that are easily accessed in the spine wall and panels without having to move return panels and components. Electrical and IT management will be easily accessible by removable wall covers which can be removed while workstation components are still attached. Specify connector system that has continuation of electrical and IT wiring within workstations and workstation to workstation.

1.9.5. Pedestals

Specify pedestals that are interchangeable from left to right, and right to left, and retain pedestal locking system capability.

1.10. EXECUTIVE FURNITURE

1.10.1. Design for executive furniture in command areas, coordinate specific locations with Corps of Engineers Interior Designer. Use upgraded furniture, upholsteries and finishes in command suites. This includes but is not limited to wood casegoods, seating and tables. Select executive furniture casegoods from a single manufacturer and style line, to include workstations, credenzas, filing, and storage, etc.

1.10.2. Specify furniture with wood veneer finish (except worksurfaces) with mitered solid wood edge of same wood type. Provide worksurface plastic laminate that closely matches adjacent wood veneer. Other executive office furniture such as seating, tables, executive conference room furniture, etc. shall be compatible in style, finish and color with executive furniture casegoods.

1.11. SEATING

1.11.1. General

Specify appropriate chair casters and glides for the floor finish where the seating is located. Universal casters that are appropriate for both hard surface flooring and carpet are preferred. All seating shall support up to a minimum of 250 lbs.

1.11.2. Desk and Guest Seating

Select ergonomic desk chairs with casters, non-upholstered adjustable arms, waterfall front, swivel, tilt, variable back lock, adjustable back height or adjustable lumbar support, pneumatic seat height adjustment, and padded, contoured upholstered seat and back. Desk and guest chair backs may be other than upholstered such as mesh fabric if it is ergonomically designed, forms to back and is comfortable. Depending on scale of desk chair provide seat pan forward and back adjustment to increase or decrease depth of seat pan. All desk chairs shall have an adjustable seat height range of 4 1/2", range to include 16 1/2"-20". Select guest chairs that are compatible in style, finish and color with the desk chairs.

1.11.3. Conference Room Seating

At tables, select ergonomic conference seating with casters, non-upholstered arms, waterfall front, swivel, tilt, pneumatic seat height adjustment, and padded, contoured seat and back, unless otherwise noted. Select arm height and/or design that allows seating to be moved up closely to the table top. Conference chair backs may be other than upholstered such as mesh fabric if it is ergonomically designed, forms to back and is comfortable. Perimeter conference chairs shall be compatible in style, finish and color with conference seating at the tables.

1.11.4. Lounge, Waiting and Reception Area Seating

Select seating with arms and cushioned, upholstered seat and back. In heavy use areas, arms shall be easily cleaned such as non-upholstered arms or upholstered arms with wood arm caps unless otherwise noted.

1.11.5. Break Room Seating

Select stackable seating that is easily cleaned. Seating shall be appropriate for table and counter heights as applicable with non-upholstered arms if arms are required. Chairs shall have metal legs and composite materials for seats.

1.11.6. Lounge, Waiting and Reception Furniture.

Design for end and coffee tables with plastic laminate tops that are compatible in style finish and color with the seating.

1.12. FILING AND STORAGE.

Select storage and shelving units that meet customer's functional load requirements for stored items. Specify counterweights for filing cabinets when required by the manufacturer for stability. File drawers shall allow only one drawer to be opened at a time. Provide heavy duty storage and shelving if information is not available.

1.13. TRAINING TABLES.

Don't use plastic laminate self edge. Training tables shall be reconfigurable, moveable and storable; lighter weight folding with dollies or casters as necessary. Specify dollies if required.

1.14. FURNITURE WARRANTIES.

Specify manufacturer's performance guarantees or warranties that include parts, labor and transportation as follows:

Furniture System, unless otherwise noted – 10 year minimum
Furniture System Task Lights – 2 year minimum, excluding bulbs
Furniture System Fabric – 3 year minimum
Desks - 10 year minimum
Seating, unless otherwise noted - 10 year minimum
Seating Mechanisms and Pneumatic Cylinders - 10 years
Fabric - 3 years minimum
Filing and Storage - 10 year minimum
Tables, unless otherwise noted - 10 year minimum
Table Mechanisms – 5 year
Table Ganging Device - 1 year
Items not listed above - 1 year minimum

ATTACHMENT C

TRACKING COMMENTS IN DRCHECKS

1.0 General

The Government and DB Contractor shall set up the project in Dr Checks. Throughout the design process, the parties shall enter, track, and back-check comments using the DrChecks system. Government reviewers enter design review comments into DrChecks. Designers of Record shall annotate comments timely and specifically to indicate exactly what action will be taken or why the action is not required. Comments considered critical by the conference participants shall be flagged as such.

2.0 DrChecks Review Comments

The Contractor and the Government shall monitor DrChecks to assure all comments are annotated and agreed to by the designers and reviewers prior to the next submittal. The DrChecks comments and responses shall be printed and included in the design analysis for record.

2.1. Conference participants (reviewers) will expect coordination between Design Analysis calculations and the submitted design. Reviewers will also focus on the design submittal's satisfaction of the contract requirements.

2.2. The Designers of Record shall answer each comment in DrChecks with a formal response prior to the next submittal, clearly indicating what action will be taken and what drawing/spec will change. Designers of Record are encouraged to directly contact reviewers to discuss and agree to the formal comment responses rather than relying only on DrChecks and review meetings to discuss comments. With the next design conference, reviewers will back-check answers to the comments against the submittal, in addition to reviewing additional design work.

2.3. Comments that, in the DB Contractor's opinion, require effort outside the scope of the contract shall be clearly indicated as such in DrChecks. The DB Contractor shall not proceed with work outside the contract until a modification to the contract is properly executed, if one is necessary.

3.0 DrChecks Initial Account Set-Up

To initialize an office's use of DrChecks, choose a contact person within the office to call the DrChecks Help Desk at 800-428-HELP, M-F, 8AM-5PM, Central time. This POC will be given an office password to distribute to others in the office. Individuals can then go to the hyperlink at <http://www.projnet.org> and register as a first time user. Upon registration, each user will be given a personal password to the DrChecks system.

3.1. Once the office and individuals are registered, the COE's project manager or lead reviewer will assign the individuals and/or offices to the specific project for review. At this point, persons assigned can make comments, annotate comments, and close comments, depending on their particular assignment.

4.0 DrChecks Reviewer Role

The Contractor is the technical reviewer and the Government is the compliance reviewer of the DB designers design documents. Each reviewer enters their own comments into the Dr Checks system. To enter comments:

4.1. Log into DrChecks.

4.2. Click on the appropriate project.

4.3. Click on the appropriate review conference. An Add comment screen will appear.

4.4. Select or fill out the appropriate sections (particularly comment discipline and type of document for sorting) of the comment form and enter the comment in the space provided.

4.5. Click the Add Comment button. The comment will be added to the database and a fresh screen will appear for the next comment you have.

- 4.6. Once comments are all entered, exit DrChecks by choosing “My Account” and then Logout.

5.0 DrChecks Comment Evaluation

The role of the designers of record is to evaluate and respond to the comments entered by the Government reviewers and by the DB Contractor. To respond to comments:

- 5.1. Log into DrChecks.
- 5.2. Click on the appropriate project.
- 5.3. Under “Evaluate” click on the number under “Pending”.
- 5.4. Locate the comments that require your evaluation. (Note: If you know the comment number you can use the Quick Pick window on your home page in DrChecks; enter the number and click on go.)
- 5.5. Select the appropriate evaluation (concur, non-concur, for information only, or check and resolve) and add the response.
- 5.6. Click on the Add button. The evaluation will be added to the database and a fresh screen will appear with the next comment.
- 5.7. Once evaluations are all entered, exit DrChecks by choosing “My Account” and then Logout.

6.0 DrChecks Back-check

At the following design conference, participants will back-check comment annotations against newly presented documents to verify that the designers' responses are acceptable and completed. The Contractor and Government reviewers shall either enter additional back-check comments, as necessary or close those that are resolved as a result of the design conferences:

- 6.1. Log into DrChecks.
- 6.2. Click on the appropriate project.
- 6.3. Under “My Backcheck” click on the number under “Pending”.
- 6.4. If you agree with the designer's response select “Close Comment” and add a closing response if desired.
- 6.5. If you do not agree with the designer's response or the submittal does not reflect the response given, select “Issue Open”, enter additional information.
- 6.6. Click on the Add button. The back-check will be added to the database and a fresh screen will appear with the next comment.
- 6.7. Once back-checks are all entered, exit DrChecks by choosing “My Account” and then Logout. The design is completed and final when there are no pending comments to be evaluated and there are no pending or open comments under back-check.

ATTACHMENT D
SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

Instructions: Use the information outlined in this document to provide the minimum requirement for development of Fire Protection and Life Safety Code submittals for all building projects. Additional and supplemental information may be used to further develop the code review. Insert N/A after criteria, which may be "not applicable".

1.0 SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

- 1.1. Project Name (insert name and location)
- 1.2. Applicable Codes and Standards
 - 1.2.1. Unified Facilities Criteria (UFC): 3-600-01, Design: Fire Protection Engineering For Facilities
 - 1.2.2. International Building Code (IBC) for fire resistance requirements, allowable floor area, building height limitations and building separation distance requirements, except as modified by UFC 3-600-01.
 - 1.2.3. National Fire Protection Association (NFPA) 101 Life Safety Code (latest edition), for building egress and life safety and applicable criteria in UFC 3-600-01.
 - 1.2.4. ADA and ABA Accessibility Guidelines. For Buildings and Facilities See Section 01 10 00, Paragraph 3 for facility specific criteria.
- 1.3. Occupancy Classification
IBC chapters 3 and 4
- 1.4. Construction Type
IBC chapter 6
- 1.5. Area Limitations
IBC chapter 5, table 503
- 1.6. Allowable Floor Areas
IBC section 503, 505
- 1.7. Allowable area increases
IBC section 506, 507
- 1.8. Maximum Height of Buildings
IBC section 504
- 1.9. Fire-resistive substitution
- 1.10. Occupancy Separations
IBC table 302.3.2
- 1.11. Fire Resistive Requirements
 - 1.11.1. Exterior Walls - [] hour rating, IBC table 601, 602
 - 1.11.2. Interior Bearing walls - [] hour rating
 - 1.11.3. Structural frame - [] hour rating
 - 1.11.4. Permanent partitions - [] hour rating

- 1.11.5. Shaft enclosures - [] hour rating
- 1.11.6. Floors & Floor-Ceilings - [] hour rating
- 1.11.7. Roofs and Roof Ceilings - [] hour rating
- 1.12. Automatic Sprinklers and others used to determine the need for automatic Extinguishing Equipment, Extinguishing Systems, Foam Systems, Standpipe
 - 1.12.1. UFC 3-600-01, chapters 4 and 6 systems, wet chemical systems, etc. State which systems are required and to what criteria they will be designed.
 - 1.12.2. UFC 3-600-01, Appendix B Occupancy Classification. Note the classification for each room. This may be accomplished by classifying the entire building and noting exceptions for rooms that differ (E.g. The entire building is Light Hazard except boiler room and storage rooms which are [], etc.)
 - 1.12.3. UFC 3-600-01, Chapter 3 Sprinkler Design Density, Sprinkler Design Area, Water Demand for Hose Streams (supply pressure and source requirements).
 - 1.12.4. UFC 3-600-01, Chapter 4 Coverage per sprinkler head. Extended coverage sprinkler heads are not permitted.
 - 1.12.5. Available Water Supply. Provide the results of the water flow tests showing the available water supply static pressure and residual pressure at flow. Based on this data and the estimated flow and pressure required for the sprinkler system, determine the need for a fire pump.
 - 1.12.6. NFPA 13, Para. 8.16.4.6.1. Provide backflow preventer valves as required by the local municipality, authority, or water purveyor. Provide a test valve located downstream of the backflow preventer for flow testing the backflow preventer at full system demand flow. Route the discharge to an appropriate location outside the building.
- 1.13. Kitchen Cooking Exhaust Equipment
Describe when kitchen cooking exhaust equipment is provided for the project. Type of extinguishing systems for the equipment should be provided. per NFPA 96. Show all interlocks with manual release switches, fuel shutoff valves, electrical shunt trips, exhaust fans, and building alarms.
- 1.14. Portable Fire Extinguishers, fire classification and travel distance. per NFPA 10
- 1.15. Enclosure Protection and Penetration Requirements. - Opening Protectives and Through Penetrations
 - 1.15.1. IBC Section 712, 715 and Table 715.3. Mechanical rooms, exit stairways, storage rooms, janitor [] hour rating. IBC Table 302.1.1
 - 1.15.2. Fire Blocks, Draft Stops, Through Penetrations and Opening Protectives
- 1.16. Fire Dampers. Describe where fire dampers and smoke dampers are to be used (IBC Section 716 and NFPA 90A). State whether isolation smoke dampers are required at the air handler.
- 1.17. Detection Alarm and Communication. UFC 3-600-01, (Chapter 5); NFPA 101 para. 3.4 (chapters 12-42); NFPA 72
- 1.18. Mass Notification. Describe building/facility mass notification system (UFC 4-021-01) type and type of base-wide mass notification/communication system. State whether the visible notification appliances will be combined with the fire alarm system or kept separate. (Note: Navy has taken position to combine visible notification appliances with fire alarm).
- 1.19. Interior Finishes (classification). NFPA 101.10.2.3 and NFPA 101.7.1.4
- 1.20. Means of Egress

- 1.20.1. Separation of Means of Egress, NFPA 101 chapters 7 and 12-42; NFPA101.7.1.3
- 1.20.2. Occupant Load, NFPA101.7.3.1 and chapters 12-42.
- 1.20.3. Egress Capacity (stairs, corridors, ramps and doors) NFPA101.7.3.3
- 1.20.4. Number of Means of Egress, NFPA101.7.4 and chapters 12-42.
- 1.20.5. Dead end limits and Common Path of Travel, NFPA 101.7.5.1.6 and chapters 12-42.
- 1.20.6. Accessible Means of Egress (for accessible buildings), NFPA101.7.5.4
- 1.20.7. Measurement of Travel Distance to Exits, NFPA101.7.6 and chapters 12-42.
- 1.20.8. Discharge from Exits, NFPA101.7.7.2
- 1.20.9. Illumination of Means of Egress, NFPA101.7.8
- 1.20.10. Emergency Lighting, NFPA101.7.9
- 1.20.11. Marking of Means of Egress, NFPA101.7.10
- 1.21. Elevators, UFC 3-600-01, Chapter 6; IBC and ASME A17.1 - 2000,(Safety Code for Elevators and Escalators)
- 1.22. Accessibility Requirements, ADA and ABA Accessibility Guidelines for Buildings and Facilities
- 1.23. Certification of Fire Protection and Life Safety Code Requirements. (Note: Edit the Fire team membership if necessary). Preparers of this document certify the accuracy and completeness of the Fire Protection and Life Safety features for this project in accordance with the attached completed form(s).
- 1.24. Designer of Record. Certification of Fire protection and Life Safety Code Requirements. (Note: Edit the Fire team members if necessary). Preparers of this document certify the accuracy and completeness of the Fire Protection and Life Safety features of this project.

Fire Protection Engineer of Record:

Signature and Stamp

Date

OR

Architect of Record:

Signature and Stamp

Date

Mechanical Engineer of Record:

Signature and Stamp

Date

Electrical Engineer of Record:

Signature/Date

ATTACHMENT E
LEED SUBMITTALS

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
GENERAL						
		GENERAL - All calculations shall be in accordance with LEED 2.2 Reference Guide.				
		GENERAL: Obtain excel version of this spreadsheet at http://en.sas.usace.army.mil/enWeb/EngineeringCriteria . OCT09REV				
		GENERAL - For all credits, narrative/comments may be added to describe special circumstances or considerations regarding the project's credit approach.				
		GENERAL - Include all required LEED drawings indicated below in contract drawings with applicable discipline drawings, labeled For Reference Only.				
		NOTE: Each submittal indicated with "****" differs from LEED certified project submittals by either having a different due date or being an added submittal not required by GBCI. OCT09REV				
		OCT09REV GENERAL - Audit documentation may include but is not limited to what is indicated in this table.				
			Closeout	List of all Final Design submittals revised after final design to reflect actual closeout conditions. Revised Final Design submittals. - OR - Statement confirming that no changes have been made since final design that effect final design submittal documents.		Proj Engr (PE)
CATEGORY 1 - SUSTAINABLE SITES						
SSPR1		Construction Activity Pollution Prevention (PREREQUISITE)	**Final Design	List of drawings and specifications that address the erosion control, particulate/dust control and sedimentation control measures to be implemented.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			**Final Design	Narrative that indicates which compliance path was used (NPDES or Local standards) and describes the measures to be implemented on the project. If a local standard was followed, provide specific information to demonstrate that the local standard is equal to or more stringent than the NPDES program.		CIV
SS1		Site Selection	Final Design	Statement confirming that project does not meet any of the prohibited criteria.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	LEED Site plan drawing that shows all proposed development, line depicting boundary of all bodies of water and/or wetlands within 100 feet of project boundary and a line depicting 5' elevation above 100 year flood line that falls within project boundary. Not required if neither condition applies.		CIV
SS2		Development Density & Community Connectivity	Final Design	Option 1: LEED Site vicinity plan showing project site and surrounding development. Show density boundary or note drawing scale.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Table indicating, for project site and all surrounding sites within density radius (keyed to site vicinity plan), site area and building area. Project development density calculation. Density radius calculation. Development density calculation within density radius.		CIV
			Final Design	Option 2: LEED Site vicinity plan showing project site, the 1/2 mile community radius, pedestrian walkways and the locations of the residential development(s) and Basic Services surrounding the project site.		CIV
			Final Design	Option 2: List (including business name and type) of all Basic Services facilities within the 1/2 mile radius, keyed to site vicinity plan.		CIV
SS3		Brownfield Redevelopment	Final Design	Narrative describing contamination and the remediation activities included in project. Include statement indicating how site was determined to be a brownfield.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS4.1		Alternative Transportation: Public Transportation Access	Final Design	Statement indicating which option for compliance applies. State whether public transportation is existing or proposed and, if proposed, cite source of this information.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: LEED Site vicinity plan showing project site, mass transit stops and pedestrian path to them with path distance noted.		CIV
			Final Design	Option 2: LEED Site vicinity plan showing project site, bus stops and pedestrian path to them with path distance noted.		CIV
SS4.2		Alternative Transportation: Bicycle Storage & Changing Rooms	Final Design	FTE calculation. Bicycle storage spaces calculation. Shower/changing facilities calculation.		CIV
			Final Design	List of drawings that show the location(s) of bicycle storage areas. Statement indicating distance from building entrance.		CIV
			Final Design	List of drawings that show the location(s) of shower/changing facilities and, if located outside the building, statement indicating distance from building entrance.		ARC
SS4.3		Alternative Transportation: Low Emitting & Fuel Efficient Vehicles	Final Design	Statement indicating which option for compliance applies. FTE calculation. Statement indicating total parking capacity of site.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Low-emission & fuel-efficient vehicle calculation.		CIV

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PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
			Final Design	Option 1: List of drawings and specification references that show location and number of preferred parking spaces for low-emission & fuel-efficient vehicles and signage.		CIV
			Final Design	Option 1: Statement indicating quantity, make, model and manufacturer of low-emission & fuel-efficient vehicles to be provided. Statement confirming vehicles are zero-emission or indicating ACEEE vehicle scores.		CIV
			Final Design	Option 2: Low-emission & fuel-efficient vehicle parking calculation.		CIV
			Final Design	Option 2: List of drawings and specification references that show location and number of preferred parking spaces and signage.		CIV
			Final Design	Option 3: Low-emission & fuel-efficient vehicle refueling station calculation.		CIV
			Final Design	Option 3: List of drawings and specifications indicating location and number of refueling stations, fuel type and fueling capacity for each station for an 8-hour period.		CIV
			Closeout	Option 3: Construction product submittals indicating what was provided and confirming compliance with respect to fuel type and fueling capacity for each station for an 8-hour period.		CIV
SS4.4		Alternative Transportation: Parking Capacity	Final Design	Statement indicating which option for compliance applies.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Preferred parking calculation including number of spaces required, total provided, preferred spaces provided and percentage.		CIV
			Final Design	Option 2: FTE calculation. Preferred parking calculation including number of spaces provided, preferred spaces provided and percentage.		CIV
			Final Design	Options 1 and 2: List of drawings and specification references that show location and number of preferred parking spaces and signage.		CIV
			Final Design	Option 3: Narrative indicating number of spaces required and provided and describing infrastructure and support programs with description of project features to support them.		CIV
SS5.1		Site Development: Protect or Restore Habitat	**Final Design	Option 1: List of drawing and specification references that convey site disturbance limits.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			**Final Design	Option 2: LEED site plan drawing that delineates boundaries of each preserved and restored habitat area with area (sf) noted for each.		CIV
			**Final Design	Option 2: Percentage calculation of restored/preserved habitat to total site area. List of drawings and specification references that convey restoration planting requirements.		CIV
SS5.2		Site Development: Maximize Open Space	Final Design	Option 2: LEED site plan drawing delineating boundary of vegetated open space adjacent to building with areas of building footprint and designated open space noted.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS6.1		Stormwater Design: Quantity Control	Final Design	Statement indicating which option for compliance applies.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Indicate pre-development and post-development runoff rate(cfs) and runoff quantity (cf) -OR - Narrative describing site conditions, measures and controls to be implemented to prevent excessive stream velocities and erosion.		CIV
			Final Design	Option 2: Indicate pre-development and post-development runoff rate(cfs) and runoff quantity (cf). Indicate percent reduction in each.		CIV
SS6.2		Stormwater Design: Quality Control	Final Design	For non-structural controls, list all BMPs used and, for each, describe the function of the BMP and indicate the percent annual rainfall treated. List all structural controls and, for each, describe the pollutant removal and indicate the percent annual rainfall treated.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS7.1		Heat Island Effect: Non-Roof	**Final Design	LEED site plan drawing indicating locations and quantities of each paving type, including areas of shaded pavement. Percentage calculation indicating percentage of reflective/shaded/open grid area.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS7.2		Heat Island Effect: Roof	Final Design	Option 1: Percentage calculation indicating percentage of SRI compliant roof area. List of drawings and specification references that convey SRI requirements and roof slopes.		ARC

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			Final Design OCT09REV	Option 1: List of specified roof materials indicating, for each, product type, manufacturer, product name and identification if known, SRI value and roof slope. OCT09REV		ARC
			**Closeout OCT09REV	Option 1: List of installed roof materials indicating, for each, manufacturer, product name and identification, SRI value and roof slope.		PE
			Closeout	X Option 1: Manufacturer published product data or certification confirming SRI		PE
			Final Design	Option 2: Percentage calculation indicating percentage of vegetated roof area.		ARC
			Final Design	Option 3: Combined reflective and green roof calculation.		ARC
			Final Design OCT09REV	Option 3: List of specified roof materials indicating, for each, product type, manufacturer, product name and identification if known, SRI value and roof slope. OCT09REV		
			**Closeout OCT09REV	Option 3: List of installed roof materials indicating, for each, manufacturer, product name and identification, SRI value and roof slope.		PE
			Closeout	X Option 3: Manufacturer published product data or certification confirming SRI		PE
SS8		Light Pollution Reduction	Final Design	Interior Lighting: List of drawings and specification references that convey interior lighting requirements (location and type of all installed interior lighting, location of non-opaque exterior envelope surfaces, allowing confirmation that maximum candela value from interior fixtures does not intersect non-opaque building envelope surfaces). - OR - List of drawings and specification references that show automatic lighting controls that turn off non-essential lighting during non-business hours		ELEC
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		ELEC
			Final Design	Exterior Lighting: List of drawings and specification references that convey exterior lighting requirements (location and type of all site lighting and building façade/landscape lighting).		ELEC
			Final Design	Exterior Site Lighting Power Density (LPD): Tabulation for exterior site lighting indicating, for each location identification or description, units of measure, area or distance of the location, actual LPD using units consistent with ASHRAE 90.1, and the ASHRAE allowable LPD for that type of location. Percentage calculation of actual versus allowable LPD for all site lighting.		ELEC
			Final Design	Exterior Building Facade/Landscape Lighting Power Density (LPD): Tabulation for exterior building facade/landscape lighting indicating, for each location identification or description, units of measure, area or distance of the location, actual LPD using units consistent with ASHRAE 90.1, and the ASHRAE allowable LPD for that type of location. Percentage calculation of actual versus allowable LPD for all building facade/landscape lighting.		ELEC
			Final Design	Exterior Lighting IESNA Zone: Indicate which IESNA zone is applicable to the project.		ELEC
			Final Design	Exterior Lighting Site Lumen table indicating, for each fixture type, quantity installed, initial lamp lumens per luminaire, initial lamp lumens above 90 degrees from Nadir, total lamp lumens and total lamp lumens above 90 degrees. Percentage of site lamp lumens above 90 degrees from nadir to total lamp lumens.		ELEC
			Final Design	Exterior Lighting Narrative describing analysis used for addressing requirements for light trespass at site boundary and beyond.		ELEC
CATEGORY 2 – WATER EFFICIENCY						
WE1.1		Water Efficient Landscaping: Reduce by 50%	Final Design	Statement indicating which option for compliance applies.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Calculation indicating, for baseline and design case, total water applied, total potable water applied, total non-potable water applied. Design case percent potable water reduction. If nonpotable water is used, indicate source of nonpotable water.		CIV
			Final Design	List of landscape plan drawings.		CIV
			Final Design	Narrative describing landscaping and irrigation design strategies, including water use calculation methodology used to determine savings and, if non-potable water is used, specific information about source and available quantity.		CIV
WE1.2		Water Efficient Landscaping: No Potable Water Use or No Irrigation	Same as WE1.1	Same as WE1.1		CIV
WE2		Innovative Wastewater Technologies	Final Design	Statement confirming which option for compliance applies.		MEC

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			Final Design	Statement confirming which occupancy breakdown applies (default or special). For special occupancy breakdown, indicate source and explanation for ratio.		MEC
			Final Design	Occupancy calculation including male/female numbers for FTEs, visitors, students, customers, residential and other type occupants/users		MEC
			Final Design	Statement indicating percent of male restrooms with urinals. Statement indicating annual days of operation.		MEC
			Final Design	Baseline flush fixture calculation spreadsheet indicating, for each fixture type, gender, flush rate, daily uses per person for each occupant type identified in occupancy calculation and annual baseline flush fixture water usage.		MEC
			Final Design	Design case flush fixture calculation spreadsheet indicating, for each fixture type, gender, fixture manufacturer, fixture model number, flush rate, percent of occupants using this fixture type, daily uses per person for each occupant type identified in occupancy calculation and annual design case flush fixture water usage.		MEC
			Final Design	Option 1: If onsite non-potable water is used, identify source(s), indicate annual quantity from each source and indicate total annual quantity from all onsite non-potable water sources.		MEC
			Final Design	Option 1: Summary calculation indicating baseline annual water consumption, design case annual water consumption, non-potable annual water consumption and total percentage annual water savings.		MEC
			Final Design	Option 2: Statement confirming on-site treatment of all generated wastewater to tertiary standards and all treated wastewater is either infiltrated or used on-site.		MEC
			Final Design	Option 2: List of drawing and specification references that convey design of on-site wastewater treatment features.		CIV
			Final Design	Option 2: On-site water treatment quantity calculation indicating all on-site wastewater source(s), annual quantity treated, annual quantity infiltrated and annual quantity re-used on site from each source and totals for annual quantity treated, annual quantity infiltrated and annual quantity re-used on site from all sources.		CIV
			Final Design	Option 2: Wastewater summary calculation indicating design case annual flush fixture water usage, annual on-site water treatment and percentage sewage conveyance reduction.		MEC
			Final Design	Narrative describing project strategy for reduction of potable water use for sewage conveyance, including specific information on reclaimed water usage and treated wastewater usage.		MEC
WE3.1		Water Use Reduction: 20% Reduction	Final Design	Statement confirming which occupancy breakdown applies (default or special). For special occupancy breakdown, indicate source and explanation for ratio.		MEC
			Final Design	Occupancy calculation including male/female numbers for FTEs, visitors, students, customers, residential and other type occupants/users		MEC
			Final Design	Statement indicating percent of male restrooms with urinals. Statement indicating annual days of operation.		MEC
			Final Design	Baseline flush fixture calculation spreadsheet indicating, for each fixture type, gender, flush rate, daily uses per person for each occupant type identified in occupancy calculation and annual baseline flush fixture water usage.		MEC
			Final Design	Design case flush fixture calculation spreadsheet indicating, for each fixture type, gender, fixture manufacturer, fixture model number, flush rate, percent of occupants using this fixture type, daily uses per person for each occupant type identified in occupancy calculation and annual design case flush fixture water usage.		MEC
			Closeout	X Manufacturer published product data or certification confirming fixture water usage.		PE
WE3.2		Water Use Reduction: 30% Reduction	Same as WE3.1	Same as WE3.1		MEC
CATEGORY 3 – ENERGY AND ATMOSPHERE						
EAPR1		Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	**Final Design	**Owner's Project Requirements document		ALL
			**Final Design	**Basis of Design document for commissioned systems		MEC, ELEC
			**Final Design	**Commissioning Plan		MEC, ELEC

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			Closeout	Statement confirming all commissioning requirements have been incorporated into construction documents.		PE
			Closeout	Commissioning Report		PE
EAPR2		Minimum Energy Performance (PREREQUISITE)	Final Design	Statement listing the mandatory provisions of ASHRAE 90.1 that project meets relative to compliance with this prerequisite and indicating which compliance path was used.		MEC ELEC ARC
EAPR3		Fundamental Refrigerant Management (PREREQUISITE)	Final Design	Statement indicating which option for compliance applies.		MEC
			Final Design	Option 2: Narrative describing phase out plan, including specific information on phase out dates and refrigerant quantities.		MEC
EA1		Optimize Energy Performance	Final Design	Statement indicating which compliance path option applies.		MEC
			Final Design	Option 1: Statement confirming simulation software capabilities and confirming assumptions and methodology.		MEC
			Final Design	Option 1: General information including simulation program, principal heating source, percent new construction and renovation, weather file, climate zone and Energy Star Target Finder score.		MEC
			Final Design	Option 1: Space summary listing, for each building use, the conditioned area, unconditioned area and total area and include total area for each category		MEC
			Final Design	Option 1: List of all simulation output advisory message data and show difference between baseline and proposed design		MEC
			Final Design	Option 1: Comparison summary for energy model inputs including description of baseline and design case energy model inputs, showing both by element type		MEC
			Final Design	Option 1: Energy type summary listing, for each energy type, utility rate description, units of energy and units of demand		MEC
			Final Design	Option 1: Statement indicating whether project uses on-site renewable energy. If yes, list all sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost		MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, statement describing how exceptional calculation measure cost savings is determined		MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, for each exceptional calculation method indicate energy types and, for each energy type, annual energy savings, annual cost savings, and brief descriptive narrative		MEC
			Final Design	Option 1: Baseline performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand for all four orientations. For each orientation indicate total annual energy use for each orientation and total annual process energy use.		MEC
			Final Design	Option 1: Baseline energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design	Option 1: Proposed Design performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand, baseline annual and peak energy demand and percent savings. Indicate total annual energy use and total annual process energy use for both proposed design and baseline and percent savings.		MEC
			Final Design	Option 1: Proposed Design energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design	Option 1: Energy cost and consumption by energy type report indicating, for each energy type, proposed design and baseline annual use and annual cost, percent savings annual use and annual cost. Indicate for renewable energy annual energy generated and annual cost. Indicate exceptional calculations annual energy savings and annual cost savings. Indicate building total annual energy use, annual energy cost for proposed design and baseline and indicate percent savings annual energy use and annual energy cost.		MEC

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			Final Design	Option 1: Compliance summaries from energy simulation software. If software does not produce compliance summaries provide output summaries and example input summaries for baseline and proposed design supporting data in the tables. Output summaries must include simulated energy consumption by end use and total energy use and cost by energy type. Example input summaries should represent most common systems and must include occupancy, use pattern, assumed envelope component sizes and descriptive features and assumed mechanical equipment types and descriptive features		MEC
			Final Design	Option 1: Energy rate tariff from project energy providers (only if not using LEED Reference Guide default rates)		MEC
EA2.1		On-Site Renewable Energy	Final Design	Statement indicating which compliance path option applies.		ELEC
			Final Design	List all on-site renewable energy sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost. Indicate total annual energy use (all sources), total annual energy cost (all sources) and percent renewable energy cost.		ELEC MEC
			Final Design	Option 1: Indicate, for renewable energy, proposed design total annual energy generated and annual cost.		ELEC MEC
			Final Design	Option 2: Indicate CBECS building type and building gross area. Provide the following CBECS data: median annual electrical intensity, median annual non-electrical fuel intensity, average electric energy cost, average non-electric fuel cost, annual electric energy use and cost, annual non-electric fuel use and cost.		ELEC MEC
			Final Design	Option 2: Narrative describing renewable systems and explaining calculation method used to estimate annual energy generated, including factors influencing performance.		ELEC MEC
EA2.2		On-Site Renewable Energy	Same as EA2.1	Same as EA2.1		ELEC MEC
EA2.3		On-Site Renewable Energy	Same as EA2.1	Same as EA2.1		ELEC MEC
EA3		Enhanced Commissioning	**Final Design	**Owner's Project Requirements document (OPR)		ALL
			**Final Design	**Basis of Design document for commissioned systems (BOD)		ELEC MEC
			**Final Design	**Commissioning Plan		ELEC MEC
			Closeout	Statement confirming all commissioning requirements have been incorporated into construction documents.		PE
			Closeout	**Commissioning Report		PE
			**Final Design	Statement by CxA confirming Commissioning Design Review		
			Closeout	Statement by CxA confirming review of Contractor submittals for compliance with OPR and BOD		PE
			Closeout	**Systems Manual		PE
			Closeout	Statement by CxA confirming completion of O&M staff and occupant training		PE
			Closeout	**Scope of work for post-occupancy review of building operation, including plan for resolution of outstanding issues		PE
			**Predesign	Statement confirming CxA qualifications and contractual relationships relative to work on this project, demonstrating that CxA is an independent third party.		MEC
EA4		Enhanced Refrigerant Management	Final Design	Refrigerant impact calculation table with all building data and calculation values as shown in LEED 2.2 Reference Guide Example Calculations		MEC
			Final Design	Narrative describing any special circumstances or explanatory remarks OCT09REV		
			Closeout	X Cut sheets highlighting refrigerant data for all HVAC components.		PE
EA5		Measurement & Verification	Closeout	Statement indicating which compliance path option applies.		PE
			Closeout	Measurement and Verification Plan		PE
			Closeout	**Scope of work for post-occupancy implementation of M&V plan		PE
EA6		Green Power	Closeout	Statement indicating which compliance path option applies.		PE
			Closeout	Option 1: Indicate proposed design total annual electric energy usage		PE
			Closeout	Option 2: Indicate actual total annual electric energy usage		PE
			Closeout	Option 3: Calculation indicating building type, total gross area, median electrical intensity and annual electric energy use		PE

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			Closeout	Green power provider summary table indicating, for each purchase type, provider name, annual quantity green power purchased and contract term. Indicate total annual green power use and indicate percent green power		PE
			Closeout	Narrative describing how Green Power or Green Tags are purchased		PE
CATEGORY 4 – MATERIALS AND RESOURCES						
MRPR1		Storage & Collection of Recyclables (PREREQUISITE)	Final Design	Statement confirming that recycling area will accommodate recycling of plastic, metal, paper, cardboard and glass. Narrative indicating any other materials addressed and coordination with pickup.		ARC
MR1.1		Building Reuse: Maintain 75% of Existing Walls, Floors & Roof	**Final Design	If project includes a building addition, confirm that area of building addition does not exceed 2x the area of the existing building.		ARC
			**Final Design	Spreadsheet listing, for each building structural/envelope element, the existing area and reused area. Total percent reused.		ARC
MR1.2		Building Reuse: Maintain 95% of Existing Walls, Floors & Roof	Same as MR1.1	Same as MR1.1		ARC
MR1.3		Building Reuse: Maintain 50% of Interior Non-Structural Elements	**Final Design	If project includes a building addition, confirm that area of building addition does not exceed 2x the area of the existing building.		ARC
			**Final Design	Spreadsheet listing, for each building interior non-structural element, the existing area and reused area. Total percent reused.		ARC
MR2.1		Construction Waste Management: Divert 50% From Disposal	**Preconstruction	Waste Management Plan		PE
			**Construction Quarterly and Closeout	Spreadsheet calculations indicating material description, disposal/diversion location (or recycling hauler), weight, total waste generated, total waste diverted, diversion percentage		PE
				OCT09REV		
			**Construction Quarterly and Closeout	Receipts/tickets for all items on spreadsheet		PE
MR2.2		Construction Waste Management: Divert 75% From Disposal	Same as MR2.1	Same as MR2.1		PE
MR3.1		Materials Reuse: 5%	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each reused/salvaged material, material description, source or vendor, cost. Total reused/salvaged materials percentage.		PE
MR3.2		Materials Reuse: 10%	Same as MR3.1	Same as MR3.1		PE
MR4.1		Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each recycled content material, material name/description, manufacturer, cost, post-consumer recycled content percent, pre-consumer recycled content percent, source of recycled content data. Total post-consumer content materials cost, total pre-consumer content materials cost, total combined recycled content materials cost, recycled content materials percentage.		PE
			Final Design or NLT Preconstruction	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV		PE
			Closeout	X Manufacturer published product data or certification, confirming recycled content percentages in spreadsheet		PE
MR4.2		Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	Same as MR4.1	Same as MR4.1		PE
MR5.1		Regional Materials: 10% Extracted, Processed & Manufactured Regionally	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each regional material, material name/description, manufacturer, cost, percent compliant, harvest distance, manufacture distance, source of manufacture and harvest location data. Total regional materials cost, regional materials percentage.		PE
			Preconstruction OCT09REV	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV		PE
			Closeout	X Manufacturer published product data or certification confirming regional material percentages in spreadsheet		PE

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MR5.2		Regional Materials:20% Extracted, Processed & Manufactured Regionally	Same as MR5.1	Same as MR5.1	PE
MR6		Rapidly Renewable Materials	Closeout	Statement indicating total materials value and whether default or actual.	PE
			Closeout	Spreadsheet calculations indicating, for each rapidly renewable material, material name/description, manufacturer, cost, rapidly renewable content percent, rapidly renewable product value. Total rapidly renewable product value, rapidly renewable materials percentage.	PE
			Final Design OCT09REV	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV	ARC
			Closeout X	Manufacturer published product data or certification confirming rapidly renewable material percentages in spreadsheet	PE
MR7		Certified Wood	Closeout	Statement indicating total materials value and whether default or actual.	PE
			Closeout	Spreadsheet calculations indicating, for each certified wood material, material name/description, vendor, cost, wood component percent, certified wood percent of wood component, FSC chain of custody certificate number. Total certified wood product value, certified wood materials percentage.	PE
			Final Design or NLT Preconstruction	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV	PE
			Closeout X	Vendor invoices, FSC chain of custody certificates and manufacturer published product data or certification confirming all certified wood materials percentages in spreadsheet.	PE
CATEGORY 5 – INDOOR ENVIRONMENTAL QUALITY					
EQPR1		Minimum IAQ Performance (PREREQUISITE)	Final Design	Statement indicating which option for compliance applies, stating applicable criteria/requirement, and confirming that project has been designed to meet the applicable requirements.	MEC
			Final Design	Narrative describing the project's ventilation design, including specifics about fresh air intake volumes and special considerations.	MEC
EQPR2		Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	Final Design	Statement indicating which option for compliance applies, stating applicable criteria/requirement, and confirming that project has been designed to meet the applicable requirements.	ARC
			Final Design	List of drawing and specification references that convey conformance to applicable requirements (signage, exhaust system, room separation details, etc).	ARC
EQ1		Outdoor Air Delivery Monitoring	Final Design	Statement indicating which option for compliance applies and confirming that project has been designed to meet the applicable requirements.	MEC
			Final Design	List of drawing and specification references that convey conformance to applicable requirements.	MEC
			Final Design	Narrative describing the project's ventilation design and CO2 monitoring system, including specifics about monitors, operational parameters and setpoints.	MEC
			Closeout X	Cut sheets for CO2 monitoring system.	PE
EQ2		Increased Ventilation	Final Design	Statement indicating which option for compliance applies and confirming that project has been designed to meet the applicable requirements.	MEC
			Final Design	Narrative describing the project's ventilation design, including specifics about zone fresh air intake volumes and demonstrating compliance.	MEC
			Final Design	Option 2: Narrative describing design method used for determining natural ventilation design, including calculation methodology/model results and demonstrating compliance.	MEC
			Final Design	List of drawing and specification references that convey conformance to applicable requirements.	MEC
EQ3.1		Construction IAQ Management Plan: During Construction	**Preconstruction	Construction IAQ Management Plan	PE
			Closeout	Statement confirming whether air handling units were operated during construction	PE
			Closeout	Dated jobsite photos showing examples of IAQ management plan practices being implemented. Label photos to indicate which practice they demonstrate. Minimum one photo of each practice at each building.	PE
			Closeout	Spreadsheet indicating, for each filter installed during construction, the manufacturer, model number, MERV rating, location installed, and if it was replaced immediately prior to occupancy.	PE
EQ3.2		Construction IAQ Management Plan: Before Occupancy	**Preconstruction	Construction IAQ Management Plan	PE

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			Closeout	Statement indicating which option for compliance applies and confirming that required activities have occurred that meet the applicable requirements.		PE
			Closeout	Option 1a: Narrative describing the project's flushout process, including specifics about temperature, airflow and duration, special considerations (if any) and demonstrating compliance.		PE
			Closeout	Option 1b: Narrative describing the project's pre-occupancy and post-occupancy flushout processes, including specifics about temperature, airflow and duration, special considerations (if any) and demonstrating compliance.		PE
			Closeout	Option 2: Narrative describing the project's IAQ testing process, including specifics about contaminants tested for, locations, remaining work at time of test, retest parameters and special considerations (if any).		PE
			Closeout	Option 2: IAQ testing report demonstrating compliance.		PE
EQ4.1		Low Emitting Materials: Adhesives & Sealants	Closeout	Spreadsheet indicating, for each applicable indoor adhesive, sealant and sealant primer used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data.		PE
			Closeout	Spreadsheet indicating, for each applicable indoor aerosol adhesive, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data - OR - Statement confirming no indoor aerosol adhesives were used for the project.		PE
			Closeout	X Manufacturer published product data or certification confirming material VOCs in spreadsheet		PE
EQ4.2		Low Emitting Materials: Paints & Coatings	Closeout	Spreadsheet indicating, for each applicable indoor paint and coating used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data.		PE
			Closeout	Spreadsheet indicating, for each applicable indoor anti-corrosive/anti-rust paint and coating used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data - OR - Statement confirming no indoor anti-corrosive/anti-rust paints were used for the project .		PE
			Closeout	X Manufacturer published product data or certification confirming material VOCs in spreadsheet		PE
EQ4.3		Low Emitting Materials: Carpet Systems	Closeout	Spreadsheet indicating, for each indoor carpet used, the manufacturer, product name/model number, if it meets LEED requirement (yes/no) and source of LEED compliance data.		PE
			Closeout	Spreadsheet indicating, for each indoor carpet cushion used, the manufacturer, product name/model number, if it meets LEED requirement (yes/no) and source of LEED compliance data - OR - Statement confirming no indoor carpet cushion was used for the project.		PE
			Closeout	X Manufacturer published product data or certification confirming material CRI label in spreadsheet		PE
EQ4.4		Low Emitting Materials: Composite Wood & Agrifiber Products	Closeout	Spreadsheet indicating, for each indoor composite wood and agrifiber product used, the manufacturer, product name/model number, if it contains added urea formaldehyde (yes/no) and source of LEED compliance data.		PE
			Closeout	X Manufacturer published product data or certification confirming material urea formaldehyde in spreadsheet		PE
EQ5		Indoor Chemical & Pollutant Source Control	Closeout OCT09REV	Spreadsheet indicating, for each permanent entryway system used, the manufacturer, product name/model number and description of system. Roll-up and carpet systems requiring weekly cleaning to earn this credit are not a permitted option for Army projects.		PE
			Final Design	List of drawing and specification references that convey locations and installation methods for entryway systems.		ARC
			Final Design	Spreadsheet indicating, for each chemical use area, the room number, room name, description of room separation features (walls, floor/ceilings, openings) and pressure differential from surrounding spaces with doors closed - OR - Statement confirming that project includes no chemical use areas and that no hazardous cleaning materials are needed for building maintenance.		ARC MEC
			Final Design	If project includes chemical use areas: List of drawing and specification references that convey locations of chemical use areas, room separation features and exhaust system.		ARC MEC
			Closeout OCT09REV	If project includes chemical use areas: Spreadsheet indicating, for AHUs/mechanical ventilation equipment serving occupied areas, the manufacturer, model number, MERV rating, location installed, and if it was replaced immediately prior to occupancy (yes/no) - OR - Statement confirming that project does not use mechanical equipment for ventilation of occupied areas.		PE

Tuesday, October 19, 2010

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
EQ6.1		Controllability of Systems: Lighting	Final Design	Calculation indicating total number of individual workstations, number of workstations with individual lighting controls and the percentage of workstations with individual lighting controls.		ELEC
			Final Design	For each shared multi-occupant space, provide a brief description of lighting controls.		ELEC
			Final Design	Narrative describing lighting control strategy, including type and location of individual controls and type and location of controls in shared multi-occupant spaces.		ELEC
EQ6.2		Controllability of Systems: Thermal Comfort	Final Design	Calculation indicating total number of individual workstations, number of workstations with individual thermal comfort controls and the percentage of workstations with individual thermal comfort controls.		MEC
			Final Design	For each shared multi-occupant space, provide a brief description of thermal comfort controls.		MEC
			Final Design	Narrative describing thermal comfort control strategy, including type and location of individual and shared multi-occupant controls.		MEC
EQ7.1		Thermal Comfort: Design	Final Design	Design criteria spreadsheet indicating, for spring, summer, fall and winter, maximum indoor space design temperature, minimum indoor space design temperature and maximum indoor space design humidity.		MEC
			Final Design	Narrative describing method used to establish thermal comfort control conditions and how systems design addresses the design criteria, including compliance with the referenced standard.		MEC
EQ7.2		Thermal Comfort: Verification	Final Design	Narrative describing the scope of work for the thermal comfort survey, including corrective action plan development		MEC
EQ8.1		Daylight & Views: Daylight 75% of Spaces	Final Design	Option 1: Table indicating all regularly occupied spaces with space area and space area with 2% daylighting factor. Sum of regularly occupied areas and regularly occupied areas with 2% daylighting factor. Percentage calculation of areas with 2% daylighting factor to total regularly occupied areas.		ARC
			Final Design	Option 1: Glazing factor calculation table		ARC
			Final Design	Option 2: Simulation model method, software and output data		ARC
			Final Design	Option 2: Table indicating all regularly occupied spaces with space area, space area with minimum 25 footcandles daylighting illumination, and method of providing glare control. Sum of regularly occupied areas and regularly occupied areas with 25 fc daylighting. Percentage calculation of areas with 25 fc daylighting to total regularly occupied areas.		ARC
			Final Design	For all occupied spaces excluded from the calculation, provide narrative indicating reasons for excluding the space.		ARC
			Final Design	List of drawing and specification references that convey exterior glazed opening head and sill heights and glazing performance properties.		ARC
			Closeout	Manufacturer published product data or certification confirming glazing Tvis in spreadsheet		PE
EQ8.2		Daylight & Views: Views for 90% of Spaces	Final Design	Table indicating all regularly occupied spaces with space area and space area with access to views. Sum of regularly occupied areas and regularly occupied areas with access to views. Percentage calculation of areas with views to total regularly occupied areas.		ARC
			Final Design	For all occupied spaces excluded from the calculation, provide narrative indicating reasons for excluding the space.		ARC
			Final Design	LEED Floor plan drawings showing line of sight diagramming of views areas in each regularly occupied space. List of drawing/specification references that convey exterior glazed opening head and sill heights.		ARC
CATEGORY 6 – FACILITY DELIVERY PROCESS						
IDc1.1		Innovation in Design	Final Design OCT09REV	Narrative describing intent, requirement for credit, project approach to the credit. List of drawings and specification references that convey implementation of credit. All other documentation that validates claimed credit.		
IDc1.2		Innovation in Design	Final Design OCT09REV			
IDc1.3		Innovation in Design	Final Design OCT09REV			
IDc1.4		Innovation in Design	Final Design OCT09REV			
IDc2		LEED Accredited Professional	Final Design	Narrative indicating name of LEED AP, company name of LEED AP, description of LEED AP's role and responsibilities in the project.		ARC

ATTACHMENT F
Version 07-07-2010

BUILDING INFORMATION MODELING REQUIREMENTS

1.0 Section 1 - Submittal Format

1.1. Design Deliverables. Develop all designs using Building Information Modeling (BIM) and Computer Aided Design (CAD) software. Design submittal drawings shall be Full-Size size, suitable for half-size scaled reproduction.

2.0 Section 2 – Design Requirements

2.1. BIM Model and Facility Data. Contractor shall use BIM application(s) and software(s) to develop project designs. "Facility Data" is defined as associated intelligent attribute data. The "Model" is defined as 3D graphics that includes Facility Data and output as described in the paragraph 'Output' below. Contractors will use the Model to produce accurate Construction Documents. For each Center of Standardization (CoS) facility type included in this project, all BIM Models and associated Facility Data shall be submitted in Bentley Systems BIM i with associated USACE Bentley BIM Workspace (which includes specific standard BIM libraries and definitions). This Workspace can be downloaded from the CAD/BIM Technology Center. [Where available, the workspace will be specific to this CoS Facility Standard Design. The Contractor will be provided a baseline multi-discipline BIM Project Model for the CoS Facility Standard Design type, where such a model exists (for the purposes of site adaptation).] The USACE Bentley BIM Workspace is dependent on specific versions of the Bentley BIM suite of products and only the versions of the software that are listed in the Contractor instructions included with the USACE BIM Workspace are permitted to be used.

2.1.1. Reference. Refer to ERDC TR-06-10, "U.S. Army Corps of Engineers Building Information Modeling Road Map" from the CAD/BIM Technology Center website for more information on the USACE BIM implementation goals.

2.2. Drawings. Deliver CAD files used for the creation of the Construction Documents Drawings per requirements in Section 01 33 16, the criteria of the USACE Huntsville Center District, and as noted herein. Specification of a CAD file format for these Drawings does not limit which BIM application(s) or software(s) may be used for project development and execution.

2.2.1. IFC Support. The Contractor's selected BIM application(s) and software(s) must support the IFC (Industry Foundation Class - see www.iai-tech.org). Submit any deviations from or additions to the IFC property sets for any new spaces, systems, and equipment for Government approval.

2.2.2. Submittal Requirements. BIM submittals shall be fully interoperable, compatible, and editable with the Bentley BIM tools. Use the specified version of the USACE Bentley BIM Workspace and conform to the requirements of **Sections 3 and 4 below**.

2.2.3. BIM Project Execution Plan.

2.2.3.1. Develop a BIM Project Execution Plan ("Plan" or "PxP") documenting the BIM and analysis technologies selected for the Project Model (integrated with the AEC CAD Standard) from concept development through As-Builts as a design, production, coordination, construction, and documentation tool and the collaborative process by which it shall be executed. See Section 7 for additional guidance on developing the Plan.

2.2.4. BIM Requirements..

2.2.4.1. Facility Data. Develop the Facility Data consisting of a set of intelligent elements for the Model (e.g., doors, air handlers, electrical panels). This Facility Data shall include all material definitions and attributes that are necessary for the Project facility design and construction. Additional data in support of Section 6 Contractor Electives is encouraged.

2.2.4.2. Model Content. The Model and Facility Data shall include, at a minimum, the requirements of Section 4 below.

2.2.4.3. Model Granularity. Models may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on a quarter inch (1/4" = 1'0") scaled drawing (e.g. at least 1/16th, 1/8th and 1/4th), or appropriately scaled civil drawings.

2.2.4.4. Output. Submitted CAD drawings (e.g., plans, elevations, sections, schedules, details, etc.) shall be derived (commonly known as extractions, views or sheets) and maintained from the submitted Model and Facility Data.

2.3. Quality Control. Implement quality control (QC) parameters for the Model, including:

2.3.1. Model Standards Checks. QC validation used to ensure that the Project Facility Data set has no undefined, incorrectly defined or duplicated elements. Report non-compliant elements and corrective action plan to correct non-compliant elements. Provide the government with detailed justification and request government approval for any non-compliant element which the contractor proposes to be allowed to remain in the Model.

2.3.2. CAD Standards Checks. QC checking performed to ensure that the fonts, dimensions, line styles, levels and other construction document formatting issues are followed per the A/E/C CADD Standard.

2.3.3. Other Parameters. Develop such other QC parameters as Contractor deems appropriate for the Project and provide to the Government for concurrence.

2.4. Design and Construction Reviews. Perform design and construction reviews at each submittal stage under Section 3 to test the Model, including:

2.4.1. Visual Checks. Checking to ensure the design intent has been followed and that there are no unintended elements in the Model.

2.4.2. Interference Management Checks. Locate conflicting spatial data in the Model where two elements are occupying the same space. Log hard interferences (e.g., mechanical vs. structural or mechanical vs. mechanical overlaps in the same location) and soft interferences, (e.g., conflicts regarding equipment clearance, service access, fireproofing, insulation) in a written report and resolve.

2.4.3. IFC Coordination View. Provide an IFC Coordination View in IFC Express format for all deliverables. Provide exported property set data for all IFC supported named building elements.

2.4.4. Other Parameters. Develop such other Review parameters as the Contractor deems appropriate for the Project and provide to the Government for concurrence..

3.0 Section 3 – Design Stage Submittal Requirements

3.1. General Submittal Requirements.

3.1.1. Provide submittals in compliance with BIM Project Execution Plan deliverables at stages as described hereinafter.

3.1.2. At each Stage in Paragraphs 3.3 through 3.6, provide a Contractor-certified written report confirming that consistency checks as identified in Paragraphs 2.3 and 2.4 have been completed. This report shall be discussed as part of the review process and shall address cross-discipline interferences, if any.

3.1.3. At each Stage in Paragraphs 3.3 through 3.6, provide the Government with:

- The Model, Facility Data, Workspace and CAD Data files in native Bentley BIM/CAD.

- A 3-D interactive review format of the Model in Bentley Navigator, Autodesk Navisworks, Adobe 3D PDF 7.0 (or later), Google Earth KMZ or other format per Plan requirements. The file format for reviews can change between submittals.

- A list of all submitted files. The list should include a description, directory, and file name for each file submitted. For all CAD sheets, include the sheet title and sheet number. Identify files that have been produced from the submitted Model and Facility Data.

3.1.4. The Government will confirm acceptability of all submittals identified in Section 3 in coordination with the USACE Huntsville Center BIM Manager

3.2. Initial Design Conference Submittal.

3.2.1. Submit a digital copy of the Plan where, in addition to Paragraph 3.1.4, the USACE Geographic District BIM Manager will coordinate with the USACE CoS BIM Manager to confirm acceptability of the Plan or advise as to additional processes or activities necessary to be incorporated.

3.2.2. Within thirty (30) days after the approval of the Plan, conduct a demonstration to review the Plan for clarification, and to verify the functionality of Model technology workflow and processes. If modifications are required, the Contractor shall complete the modifications and resubmit the Plan and perform subsequent demonstration for Government acceptance. There will be no payment for design or construction until the Plan is acceptable to the Government. The Government may also withhold payment for design and construction for unacceptable performance in executing the approved Plan.

3.3. Interim Design Submittals.

3.3.1. BIM and CAD Data. The Model shall include the requirements identified in Paragraph 2.2.4 as applicable to the Interim Design package(s).

3.4. Final Design Submissions and Design Complete Submittals.

3.4.1. BIM and CAD Data. The Model shall include the requirements identified in Paragraph 2.2.4. Acceptance according to Paragraph 3.1.4 is required before commencement of construction, as described in Paragraph 3.7.6 of Section 01 33 16.

3.5. Construction Submittals – Over-The-Shoulder Progress Reviews. Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model, including interference management and design change tracking information.

3.6. Final As-Built BIM and CAD Data Submittal. Submit the final Model, Facility Data, and CAD files reflecting as-built conditions for Government Approval, as specified in Section 01 78 02.00 10, PROJECT CLOSEOUT.

4.0 Section 4 – BIM Model Minimum Requirements and Output

4.1. General Provisions. The deliverable Model shall be developed to include the systems described below as they would be built and the processes of installing them, and to reflect final as-built conditions. The deliverable model at the interim design stage and at the final design stage (“released for construction”) shall be developed to include as many of the systems described below as are necessary and appropriate at that design stage.

4.2. Architectural/Interior Design. The Architectural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing. Additional minimum Model requirements include:

4.2.1. Spaces. The Model shall include spaces defining accurate net square footage and net volume, and holding data for the room finish schedule for including room names and numbers. Include Programmatic Information provided by the Government or validated program to verify design space against programmed space, using this information to validate area quantities.

4.2.2. Walls and Curtain Walls. Each wall shall be depicted to the exact height, length, width and ratings (thermal, acoustic, fire) to properly reflect wall types. The Model shall include all walls, both interior and exterior, and the necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

4.2.3. Doors, Windows and Louvers. Doors, windows and louvers shall be depicted to represent their actual size, type and location. Doors and windows shall be modeled with the necessary intelligence to produce accurate window and door schedules.

4.2.4. Roof. The Model shall include the roof configuration, drainage system, penetrations, specialties, and the necessary intelligence to produce accurate plans, building sections and generic wall sections where roof design elements are depicted.

4.2.5. Floors. The floor slab shall be developed in the structural Model and then referenced by the architectural Model for each floor of the Project building.

4.2.6. Ceilings. All heights and other dimensions of ceilings, including soffits, ceiling materials, or other special conditions shall be depicted in the Model with the necessary intelligence to produce accurate plans, building sections and generic wall sections where ceiling design elements are depicted.

4.2.7. Vertical Circulation. All continuous vertical components (i.e., non-structural shafts, architectural stairs, handrails and guardrails) shall be accurately depicted and shall include the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.

4.2.8. Architectural Specialties and Woodwork. All architectural specialties (i.e., toilet room accessories, toilet partitions, grab bars, lockers, and display cases) and woodwork (i.e., cabinetry and counters) shall be accurately depicted with the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.

4.2.9. Signage. The Model shall include all signage and the necessary intelligence to produce accurate plans and schedules.

4.2.10. Schedules. Provide door, window, hardware sets using BHMA designations, flooring, wall finish, and signage schedules from the Model, indicating the type, materials and finishes used in the design.

4.3. Furniture. The furniture systems Model may vary in level of detail for individual elements within a Model, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing, and have necessary intelligence to produce accurate plans. Representation of furniture elements is to be 2D. Contractor may provide a minimal number of 3D representations as examples. Examples of furniture include, but are not limited to, desks, furniture systems, seating, tables, and office storage.

4.3.1. Furniture Coordination. Furniture that makes use of electrical, data or other features shall include the necessary intelligence to produce coordinated documents and data.

4.4. Equipment. The Model may vary in level of detail for individual elements within a Model. Equipment shall be depicted to meet layout requirements with the necessary intelligence to produce accurate plans and minimum schedules depicting their configuration. Examples of equipment include but are not limited to copiers, printers, refrigerators, ice machines and microwaves.

4.4.1. Schedules. Provide furniture and equipment schedules from the model indicating the materials, finishes, mechanical, and electrical requirements.

4.5. Structural. The structural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

4.5.1. Foundations. All necessary foundation and/or footing elements, with necessary intelligence to produce accurate plans and elevations

4.5.2. Floor Slabs. Structural floor slabs shall be depicted, including all necessary recesses, curbs, pads, closure pours, and major penetrations accurately depicted.

4.5.3. Structural Steel. All steel columns, primary and secondary framing members, and steel bracing for the roof and floor systems (including decks), including all necessary intelligence to produce accurate structural steel framing plans and related building/wall sections.

4.5.4. Cast-in-Place Concrete. All walls, columns, and beams, including necessary intelligence to produce accurate plans and building/wall sections depicting cast-in-place concrete elements.

4.5.5. Expansion/Contraction Joints. Joints shall be accurately depicted.

4.5.6. Stairs. The structural Model shall include all necessary openings and framing members for stair systems, including necessary intelligence to produce accurate plans and building/wall sections depicting stair design elements.

4.5.7. Shafts and Pits. The structural Model shall include all necessary shafts, pits, and openings, including necessary intelligence to produce accurate plans and building/wall sections depicting these design elements.

4.6. Mechanical. The mechanical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Small diameter (less than 1-1/2" NPS) field-routed piping is not required in the model. Additional minimum Model requirements include:

4.6.1. HVAC. All necessary heating, ventilating, air-conditioning and specialty equipment, including air distribution ducts for supply, return, and ventilation and exhaust ducts, including control system, registers, diffusers, grills and hydronic baseboards with necessary intelligence to produce accurate plans, elevations, building/wall sections and schedules.

4.6.1.1. Mechanical Piping. All necessary piping and fixture layouts, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, and schedules.

4.6.2. Plumbing. All necessary plumbing piping and fixture layouts, floor and area drains, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules.

4.6.3. Equipment Clearances. All HVAC and Plumbing equipment clearances shall be modeled for use in interference management and maintenance access requirements.

4.6.4. Elevator Equipment. The Model shall include the necessary equipment and control system, including necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

4.7. Electrical/Telecommunications. The electrical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Small diameter (less than 1-1/2"Ø) field-routed conduit is not required in the model. Additional minimum Model requirements include:

4.7.1. Interior Electrical Power and Lighting. All necessary interior electrical components (i.e., lighting, receptacles, special and general purpose power receptacles, lighting fixtures, panelboards, cable trays and control systems), including necessary intelligence to produce accurate plans, details and schedules. Lighting and power built into furniture/equipment shall be modeled.

4.7.2. Special Electrical Systems. All necessary special electrical components (i.e., security, Mass Notification, Public Address, nurse call and other special occupancies, and control systems), including necessary intelligence to produce accurate plans, details and schedules.

4.7.3. Grounding Systems. Grounding Systems. All necessary grounding components (i.e., lightning protection systems, static grounding systems, communications grounding systems, bonding), including necessary intelligence to produce accurate plans, details and schedules.

4.7.4. Communications. All existing and new communications service controls and connections, both above ground and underground with necessary intelligence to produce accurate plans, details and schedules. Cable tray routing shall be modeled without detail of cable contents.

4.7.5. Exterior Building Lighting. All necessary exterior lighting with necessary intelligence to produce accurate plans, elevations and schedules. The exterior building lighting Model shall include all necessary lighting, relevant existing and proposed support utility lines and equipment required with necessary intelligence to produce accurate plans, details and schedules.

4.7.6. Equipment Clearances. The model shall incorporate and define all electrical and communications working spaces, clearances, and required access

4.8. Fire Protection. The fire protection system Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

4.8.1. Fire Protection System. All relevant fire protection components (i.e., branch piping, sprinkler heads, fittings, drains, pumps, tanks, sensors, control panels) with necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules. All fire protection piping shall be modeled.

4.8.2. Fire Alarms. Fire alarm/mass notification devices and detection system shall be indicated with necessary intelligence to produce accurate plans depicting them.

4.9. Civil. The civil Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a one inch (1"=100') scaled drawing. Additional minimum Model requirements include:

4.9.1. Terrain (DTM). All relevant site conditions and proposed grading, including necessary intelligence to produce accurate Project site topographical plans and cross sections.

4.9.2. Drainage. All existing and new drainage piping, including upgrades thereto, including necessary intelligence to produce accurate plans and profiles for the Project site.

4.9.3. Storm Water and Sanitary Sewers. All existing and new sewer structures and piping, including upgrades thereto, on the Project site with necessary connections to mains or other distribution points as appropriate, including necessary intelligence to produce accurate plans and profiles for the Project site.

4.9.4. Utilities. All necessary new utilities connections from the Project building(s) to the existing or newly-created utilities, and all existing above ground and underground utility conduits, including necessary intelligence to produce accurate plans and site-sections.

4.9.5. Roads and Parking. All necessary roadways and parking lots or parking structures, including necessary intelligence to produce accurate plans, profiles and cross-sections.

5.0 Section 5 - Ownership and Rights in Data

5.1. Ownership. The Government has ownership of and rights at the date of Closeout Submittal to all CAD files, BIM Model, and Facility Data developed for the Project in accordance with FAR Part 27, clauses incorporated in Section 00 72 00, Contract Clauses and Special Contract Requirement 1.14 GOVERNMENT RE-USE OF DESIGN (Section 00 73 00). The Government may make use of this data following any deliverable.

6.0 Section 6 – Contractor Electives

6.1. Applicable Criteria. If the Contractor elected to include one or more of the following features as an elective in its accepted contract proposal for additional credit during the source selection, as described in the proposal submission requirements and evaluation criteria, the following criteria are requirements, as applicable to those elective feature(s).

6.2. COBIE Compliance. The Model and Facility Data for the Project shall fulfill Construction Operations Building Information Exchange (COBIE) requirements as defined by the Whole Building Design Guide organization, including all requirements for the indexing and submission of Portable Document Format (PDF) and other appropriate file formats that would otherwise be printed and submitted in compliance with Project operations and maintenance handover requirements.

6.3. Project Scheduling using the Model. In the BIM Execution Plan and during the Preliminary BIM Execution Plan Review, provide an overview of the use of BIM in the development and support of the project construction schedule.

6.3.1. Submittal Requirements. During the Submittal stages, the Contractor shall deliver the construction schedule with information derived from the Model.

6.3.1.1. Construction Submittals – Over-The-Shoulder Progress Reviews. Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model for project scheduling.

6.4. Cost Estimating. In the BIM Execution Plan and during the Preliminary BIM Execution Plan Review, provide an overview of the use of BIM in the development and support of cost estimating requirements, or other applications such as cost analysis and estimate validation.

6.4.1. Submittal Requirements. During the Submittal stages, the Contractor shall deliver cost estimating information derived from the Model.

6.4.2. Project completion. At project completion, the Contractor shall provide an MII (Micro Computer Aided Cost Estimating System Generation II) Cost Estimate which follows the USACE Cost Engineering Military Work Breakdown System (WBS), a modified Uniformat, to at least the sub-systems level and uses quantity information supplied directly from BIM output to the maximum extent possible, though other "Gap" quantity information will be included as necessary for a complete and accurate cost estimate.

6.4.2.1. Sub system level extracted quantities from the BIM for use within the estimate shall be provided according to how detailed line items or tasks should be installed/built so that accurate costs can be developed and/or reflected. Therefore, when developing a BIM, the designer shall be cognizant of what tasks need to be separated appropriately at the beginning stages of model development, such as tasks done on the first floor versus the same task on higher floors that will be more labor intensive and therefore need to have a separate quantity and be priced differently. Tasks and their extracted quantities from the BIM shall be broken down by their location (proximity in the structure) as well as the complexity of its installation.

6.4.2.2. At all design stages it shall be understood that BIM output as described in this document will not generate all quantities that are necessary in order to develop a complete and accurate cost estimate of the project based on the design. An example of this would be plumbing that is less than 1.5" diameter and therefore not expected to be modeled due to granularity; this information is commonly referred to as The Gap. Quantities from The Gap and their associated costs shall be included in the final project actual cost estimates as well.

6.5. Other Analyses and Reports. Structural, energy and efficiency, EPACT 2005 & EISA 2007, lighting design, daylighting, electrical power, psychrometric processing, shading, programming, LEED, fire protection, code compliance, Life Cycle Cost, acoustic, plumbing.

7.0 Section 7 – BIM Project Execution Plan Template

7.1. Contractors will utilize the latest version of the USACE BIM PROJECT EXECUTION PLAN (USACE PxP) Template to develop an acceptable Plan. The template can be downloaded from the CAD/BIM Technology Center website.

ATTACHMENT G**DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT**

Organize electronic design submittal files in a subdirectory/file structure in accordance with the following table. The Contractor may suggest a slightly different structure, subject to the discretion of the government.

Design Submittal Directory and Subdirectory File Arrangement.

Directory	Sub-Directory	Sub-Directory or Files	Files
Submittal/Package Name	Narratives	PDF file or files with updated design narrative for each applicable design discipline	
	Drawings	PDF (subdirectory)	Single PDF file with all applicable drawing sheets - bookmarked by sheet number and name
		BIM (subdirectory) See Attachment F.	BIM project folder (with files) per the USACE Workspace. Include an Excel drawing index file with each drawing sheet listed by sheet #, name and corresponding dgn file name (Final Design & Design Complete only)
	Design Analysis & Calculations	Individual PDF files containing design analysis and calculations for each discipline applicable to the submittal	
		PDF file with Fire Protection and Life Safety Code Review checklist	
	LEED	PDF file with updated Leed Check List	
		PDF file or files with LEED Templates for each point with applicable documentation included in each file.	
		LEED SUBMITTALS	
	Energy Analysis	PDF with baseline energy consumption analysis	
		PDF with actual building energy consumption analysis	
	Specifications	Single PDF file with table of contents and all applicable specifications sections.	
		Submittal Register (Final Design & Design Complete submittal only)	
	Design Quality Control	PDF file or files with DQC checklist(s) and/or statements	
	Building Rendering(s)	PDF file of rendering for each building type included in contract (Final Design & Design Complete).	

SECTION 01 45 04.00 10
CONTRACTOR QUALITY CONTROL

1.0 GENERAL

1.1. REFERENCES

1.2. PAYMENT

2.0 PRODUCTS (NOT APPLICABLE)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

3.2. QUALITY CONTROL PLAN

3.3. COORDINATION MEETING

3.4. QUALITY CONTROL ORGANIZATION

3.5. SUBMITTALS AND DELIVERABLES

3.6. CONTROL

3.7. TESTS

3.8. COMPLETION INSPECTION

3.9. DOCUMENTATION

3.10. NOTIFICATION OF NONCOMPLIANCE

1.0 GENERAL

1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Refer to the latest edition, as of the date of the contract solicitation.

- ASTM INTERNATIONAL (ASTM)
- ASTM D 3740 Minimum Requirements for Agencies
Engaged in the Testing and/or Inspection
of Soil and Rock as Used in Engineering
Design and Construction
- ASTM E 329 Agencies Engaged in the Testing
and/or Inspection of Materials Used in
Construction
- U.S. ARMY CORPS OF ENGINEERS (USACE)
ER 1110-1-12 Quality Management

1.2. PAYMENT

There will be no separate payment for providing and maintaining an effective Quality Control program. Include all costs associated therewith in the applicable unit prices or lump-sum prices contained in the Contract Line Item Schedule.

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product, which complies with the contract requirements. The system shall cover all design and construction operations, both onsite and offsite, and shall be keyed to the proposed design and construction sequence. The site project superintendent is responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager responsible for the overall construction activities at the site, including quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction related activities at the site.

3.2. QUALITY CONTROL PLAN

Furnish for Government review, not later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first 30 days of operation. Design and construction may begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. The Government will not permit work outside of the features of work included in an accepted interim plan to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started. Where the applicable Code issued by the International Code Council calls for an inspection by the Building Official, the Contractor shall include the inspections in the Quality Control Plan and shall perform the inspections. The Designer of Record shall develop a program for any special inspections required by the applicable International Codes and the Contractor shall perform these inspections, using qualified inspectors. Include the special inspection plan in the QC Plan.

3.2.1. Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all design and construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents subcontractors, designers of record, consultants, architect/engineers (AE), fabricators, suppliers, and purchasing agents:

3.2.1.1. A description of the quality control organization. Include a chart showing lines of authority and an acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. A CQC System Manager shall report to the project superintendent or someone higher in the contractor's organization.

3.2.1.2. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function. Also include those responsible for performing and documenting the inspections required by the International Codes and the special inspection program developed by the designer of record.

3.2.1.3. A copy of the letter to the CQC System Manager, signed by an authorized official of the firm, which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Furnish copies of these letters.

3.2.1.4. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents subcontractors, designers of record, consultants, architect engineers (AE), offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

3.2.1.5. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. Use only Government approved Laboratory facilities.

3.2.1.6. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

3.2.1.7. Procedures for tracking design and construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified deficiencies have been corrected.

3.2.1.8. Reporting procedures, including proposed reporting formats.

3.2.1.9. A list of the definable features of work. A definable feature of work is a task, which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the coordination meeting.

3.2.1.10. A list of all inspections required by the International Codes and the special inspection program required by the code and this contract.

3.2.2. Additional Requirements for Design Quality Control (DQC) Plan

The following additional requirements apply to the Design Quality Control (DQC) plan:

3.2.2.1. The Contractor's QCP Plan shall provide and maintain a Design Quality Control (DQC) Plan as an effective quality control program which will assure that all services required by this design-build contract are performed and provided in a manner that meets professional architectural and engineering quality standards. As a minimum, competent, independent reviewers identified in the DQC Plan shall review all documents. Use personnel who were not involved in the design effort to produce the design to perform the independent technical review (ITR). The ITR is intended as a quality control check of the design. Include, at least, but not necessarily limited to, a review of the contract requirements (the accepted contract or task order proposal and amended RFP), the basis of design, design calculations, the design configuration management documentation and check the design documents for

errors, omissions, and for coordination and design integration. The ITR team is not required to examine, compare or comment concerning alternate design solutions but should concentrate on ensuring that the design meets the contract requirements. Correct errors and deficiencies in the design documents prior to submitting them to the Government.

3.2.2.2. Include in the DQC Plan the discipline-specific checklists to be used during the design and quality control of each submittal. Submit these completed checklists at each design phase as part of the project documentation.

3.2.2.3. A Design Quality Control Manager, who has the responsibility of being cognizant of and assuring that all documents on the project have been coordinated, shall implement the DQC Plan. This individual shall be a person who has verifiable engineering or architectural design experience and is a registered professional engineer or architect. Notify the Government, in writing, of the name of the individual, and the name of an alternate person assigned to the position.

3.2.3. Acceptance of Plan

Government acceptance of the Contractor's plan is required prior to the start of design and construction. Acceptance is conditional and will be predicated on satisfactory performance during the design and construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.4. Notification of Changes

After acceptance of the CQC Plan, notify the Government in writing of any proposed change. Proposed changes are subject to Government acceptance.

3.3. COORDINATION MEETING

After the Postaward Conference, before start of design or construction, and prior to acceptance by the Government of the CQC Plan, the Contractor and the Government shall meet and discuss the Contractor's quality control system. Submit the CQC Plan for review a minimum of 7 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, design activities, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. The Government will prepare minutes of the meeting for signature by both parties. . The minutes shall become a part of the contract file. There may be occasions when either party will call for subsequent conferences to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4. QUALITY CONTROL ORGANIZATION

3.4.1. Personnel Requirements

The requirements for the CQC organization are a CQC System Manager, a Design Quality Manager, and sufficient number of additional qualified personnel to ensure contract compliance. The CQC organization shall also include personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly. The Contractor's CQC staff shall maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff shall be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly furnish complete records of all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2. CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System

Manager shall be a graduate engineer, graduate architect, or a BA/BS graduate of an ACCE accredited construction management college program. The CQC system Manager may alternately be an engineering technician with at least 2 years of college and an ICC certification as a Commercial Building Inspector (Residential Building Inspector certification will be required for Military Family Housing projects). In addition, the CQC system manager shall have a minimum of 5 years construction experience on construction similar to this contract. The CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. Assign the CQC System Manager no other duties (except may also serve as Safety and Health Officer, if qualified and if allowed by Section 00 73 00). Identify an alternate for the CQC System Manager in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager but the alternate may have other duties in addition to serving in a temporary capacity as the acting QC manager.

3.4.3. CQC Personnel

3.4.3.1. In addition to CQC personnel specified elsewhere in the contract provide specialized CQC personnel to assist the CQC System Manager in accordance with paragraph titled Area Qualifications.

3.4.3.2. These individuals may be employees of the prime or subcontractor; be responsible to the CQC System Manager; **are not intended to be full time, but must be physically present at the construction site during work on their areas of responsibility**; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan. **One person may cover more than one area, provided that they are qualified to perform QC activities for the designated areas below and provided that they have adequate time to perform their duties:**

3.4.4. Experience Matrix

3.4.4.1. Area Qualifications

3.4.4.1.1. Civil - Graduate Civil Engineer or (BA/BS) graduate in construction management with 4 years experience in the type of work being performed on this project or engineering technician with 5 yrs related experience.

3.4.4.1.2. Mechanical - Graduate Mechanical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or engineering technician with an ICC certification as a Commercial Mechanical Inspector with 5 yrs related experience.

3.4.4.1.3. Electrical - Graduate Electrical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or engineering technician with an ICC certification as a Commercial Electrical Inspector with 5 yrs related experience.

3.4.4.1.4. Structural - Graduate Structural Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or person with an ICC certification as a Reinforced Concrete Special Inspector and Structural Steel and Bolting Special Inspector (as applicable to the type of construction involved) with 5 yrs related experience.

3.4.4.1.5. Plumbing - Graduate Mechanical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience, or person with an ICC certification as a Commercial Plumbing Inspector with 5 yrs related experience.

3.4.4.1.6. Concrete, Pavements and Soils Materials Technician (present while performing tests) with 2 yrs experience for the appropriate area

3.4.4.1.7. Testing, Adjusting and Balancing Specialist must be a member (TAB) Personnel of AABC or an experienced technician of the firm certified by the NEBB (present while testing, adjusting, balancing).

3.4.4.1.8. Design Quality Control Manager Registered Architect or Professional Engineer (not required on the construction site)

3.4.4.1.9. Registered Fire Protection Engineer with 4 years related experience or engineering technician with 5 yrs related experience (but see requirements for Fire Protection Engineer of Record to witness final testing in Section 01 10 00, paragraph 5.10, Fire Protection).

3.4.4.1.10. QC personnel assigned to the installation of the telecommunication system or any of its components shall be Building Industry Consulting Services International (BICSI) Registered Cabling Installers, Technician Level. Submit documentation of current BICSI certification. In lieu of BICSI certification, QC personnel shall have a minimum of 5 years experience in the installation of the specified copper and fiber optic cable and components. They shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products. QC personnel shall witness and certify the testing of telecommunications cabling and equipment.

3.4.5. Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management for Contractors". This course is periodically offered at Fort Worth District, Corps of Engineers. Inquire of the District or Division sponsoring the course for fees and other expenses involved, if any, for attendance at this course.

3.4.6. Organizational Changes

When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5. SUBMITTALS AND DELIVERABLES

Make submittals as specified in Section 01 33 00 **SUBMITTAL PROCEDURES**. The CQC organization shall certify that all submittals and deliverables are in compliance with the contract requirements.

3.6. CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. The CQC organization shall conduct at least three phases of control for each definable feature of the construction work as follows:

3.6.1. Preparatory Phase

Perform this phase prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

3.6.1.1. A review of each paragraph of applicable specifications, reference codes, and standards. Make a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field at the preparatory inspection. Maintain these copies in the field, available for use by Government personnel until final acceptance of the work.

3.6.1.2. A review of the contract drawings.

3.6.1.3. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

3.6.1.4. Review of provisions that have been made to provide required control inspection and testing.

3.6.1.5. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

3.6.1.6. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

3.6.1.7. A review of the appropriate activity hazard analysis to assure safety requirements are met.

3.6.1.8. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

3.6.1.9. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

3.6.1.10. Discussion of the initial control phase.

3.6.1.11. Notify the Government at least 24 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2. Initial Phase

Accomplish this phase at the beginning of a definable feature of work. Include the following actions:

3.6.2.1. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

3.6.2.2. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

3.6.2.3. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

3.6.2.4. Resolve all differences.

3.6.2.5. Check safety to include compliance with and upgrading of the Accident Prevention plan and activity hazard analysis. Review the activity analysis with each worker.

3.6.2.6. Notify the Government at least 24 hours in advance of beginning the initial phase. The CQC System Manager shall prepare and attach to the daily CQC report separate minutes of this phase. Indicate exact location of initial phase for future reference and comparison with follow-up phases.

3.6.2.7. Repeat the initial phase any time acceptable specified quality standards are not being met.

3.6.3. Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Conduct final follow-up checks and correct deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

3.6.4. Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7. TESTS

3.7.1. Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements and project design documents. Upon request, furnish to the Government

duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory, or establish an approved testing laboratory at the project site. The Contractor may elect to use a laboratory certified and accredited by the Concrete and cement Reference Laboratory (CCRL) or by AASHTO Materials Reference Laboratory (AMRL) for testing procedures that those organizations certify. The Contractor shall perform the following activities and record and provide the following data:

3.7.1.1. Verify that testing procedures comply with contract requirements and project design documents.

3.7.1.2. Verify that facilities and testing equipment are available and comply with testing standards.

3.7.1.3. Check test instrument calibration data against certified standards.

3.7.1.4. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

3.7.1.5. Include results of all tests taken, both passing and failing tests, recorded on the CQC report for the date taken. Include specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2. Testing Laboratories

3.7.2.1. Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.2.2. Capability Recheck

If the selected laboratory fails the capability check, the Government will assess the Contractor a charge of \$1,375 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3. Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4. Furnishing or Transportation of Samples for Government Quality Assurance Testing

The Contractor is responsible for costs incidental to the transportation of samples or materials. Deliver samples of materials for test verification and acceptance testing by the Government to the Corps of Engineers Laboratory, f.o.b., at the following address:

- For delivery by mail:
Infrastructure/Community Resident Office
Shahrukh Shahzada
Bldg T-0071, Corner of Sapper & Velez Streets
Ft. Bliss, TX 79916
- For other deliveries:
Infrastructure/Community Resident Office

Shahrukh Shahzada

Bldg T-0071, Corner of Sapper & Velez Streets

Ft. Bliss, TX 79916

The area or resident office will coordinate, exact delivery location, and dates for each specific test.

3.8. COMPLETION INSPECTION

3.8.1. Punch-Out Inspection

Near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications, the CQC Manager shall conduct an inspection of the work. Prepare a punch list of items which do not conform to the approved drawings and specifications and include in the CQC documentation, as required by paragraph DOCUMENTATION. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2. Pre-Final Inspection

As soon as practicable after the notification above, the Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. Accomplish these inspections and any deficiency corrections required by this paragraph within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3. Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall attend the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups and major commands may also attend. The Government will formally schedule the final acceptance inspection based upon results of the Pre-Final inspection. Provide notice to the Government at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9. DOCUMENTATION

3.9.1. Maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers using government-provided software, QCS (see Section 01 45 01.10). The report includes, as a minimum, the following information:

3.9.1.1. Contractor/subcontractor and their area of responsibility.

3.9.1.2. Operating plant/equipment with hours worked, idle, or down for repair.

3.9.1.3. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

- 3.9.1.4. Test and/or control activities performed with results and references to specifications/drawings requirements. Identify the applicable control phase (Preparatory, Initial, Follow-up). List deficiencies noted, along with corrective action.
- 3.9.1.5. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- 3.9.1.6. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.
- 3.9.1.7. Offsite surveillance activities, including actions taken.
- 3.9.1.8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- 3.9.1.9. Instructions given/received and conflicts in plans and/or specifications.
- 3.9.1.10. Provide documentation of design quality control activities. For independent design reviews, provide, as a minimum, identity of the ITR team, the ITR review comments, responses and the record of resolution of the comments.
- 3.9.2. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. Furnish the original and one copy of these records in report form to the Government daily within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, submit one report for every 7 days of no work and on the last day of a no work period. Account for all calendar days throughout the life of the contract. The first report following a day of no work shall be for that day only. The CQC System Manager shall sign and date reports. The report shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel. The Contractor may submit these forms electronically, in lieu of hard copy.

3.10. NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

End of Section 01 45 04.00 10

**SECTION 01 50 02.0001
TEMPORARY CONSTRUCTION FACILITIES**

1.0 OVERVIEW

1.1. GENERAL REQUIREMENTS

1.3. BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

1.0 OVERVIEW

1.1. GENERAL REQUIREMENTS

1.1.1. This section contains requirements specifically applicable to this task order. The requirements of Base ID/IQ contract Section 01 50 02 apply to this task order, except as otherwise specified herein.

1.3. BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

1.3.1. Bulletin Board (As Specified in Base contract)

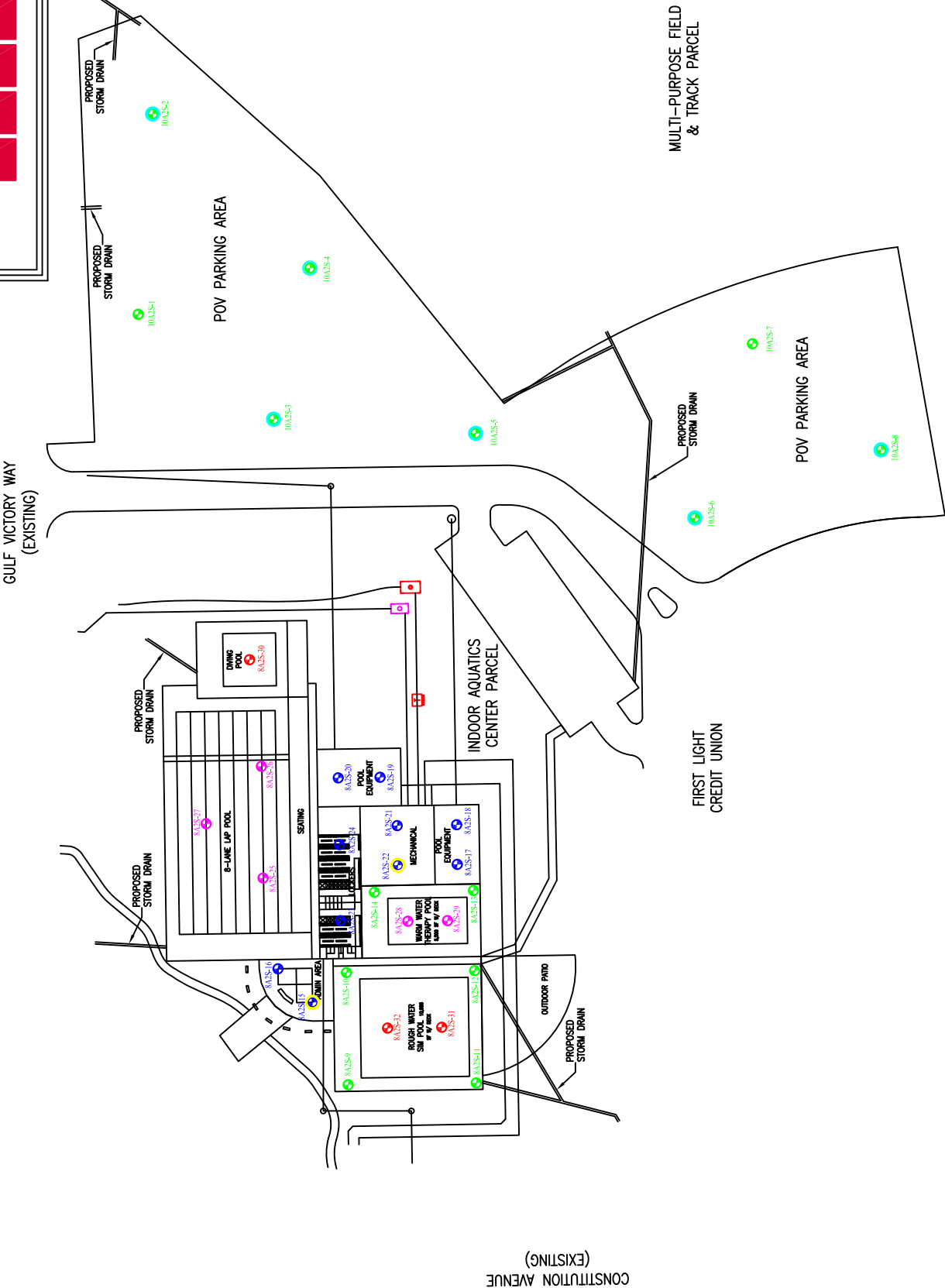
1.3.2. Project and Safety Signs (Added to Stress standardization of signs, in the event that the Base ID/IQ Section 01 50 02 does not contain this information)

Erect a project sign and a site safety sign with informational details as provided by the Government at the Post award conference, within 15 days prior to any work activity on project site. Update the safety sign data daily, with light colored metallic or non-metallic numerals. Remove the signs from the site upon completion of the project. Engineer Pamphlet EP 310-1-6a contains the standardized layout and construction details for the signs. It can be found through a GOOGLE Search or try <http://www.usace.army.mil/publications/eng-pamphlets/ep310-1-6a/s-16.pdf>.

End of Section 01 50 02.0001

APPENDIX A

GEOTECHNICAL INFORMATION



Drawing 1
N.T.S.

Boring
Plan

- 10 Foot In Depth (Total 14)
- 25 Foot In Depth (Total 10)
- 30 Foot In Depth (Total 5)
- 40 Foot In Depth (Total 3)
- Thermal, Electrical
- DCP

Indoor Aquatic Center
Fort Bliss, TX
ENCON Project # 800-10

UNIFIED SOIL CLASSIFICATION SYSTEM

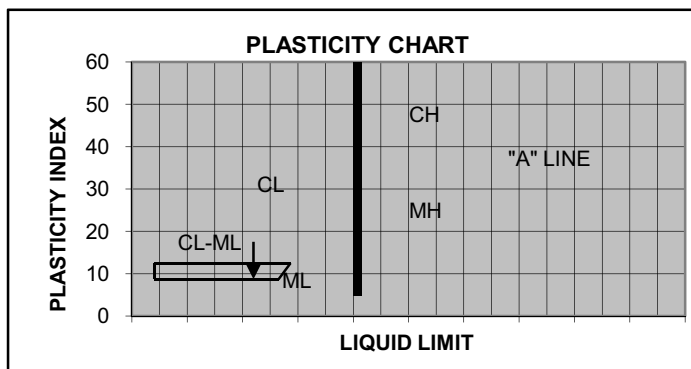
Soils are visually classified by the Unified Soil Classification System on the boring logs presented in the report. Grain-size analysis and Atterberg Limits Tests are often performed on selected samples to aid in classification. The classification system is briefly outlined on this chart. For a more detailed description of the system, see "The Unified Soil Classification System". Corp of Engineers, US Army Technical Memorandum no. 3-357 (Revised April 1960) or ASTM Designation: D2487-93T

MAJOR DIVISIONS				GRAPHIC SYMBOLS	GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS (Less than 50% Passes No. 200 sieve)	GRAVELS (60% or less of coarse fraction passes No. 4 sieve)	CLEAN GRAVELS (Less than 5% passes No. 200 sieve)			GW	Well graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures
					GP	Poorly graded gravels, gravel-sand mixtures or sand-gravel-cobble mixtures
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve)	"A" Limits plot below line or hatched zone on plasticity chart		GM	Silty gravels, gravel-sand-silt mixtures
			"A" Limits plot above line and hatched zone on plasticity chart		GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS (More than 50% of coarse fraction passes No. 4 sieve)	CLEAN SANDS (Less than 5% passes No. 200 sieve)			SW	Well graded sands, gravelly sands
					SP	Poorly graded sands, gravelly sand
		SANDS WITH FINES (More than 12% passes No. 200 sieve)	"A" Limits plot below line or hatched zone on plasticity chart		SM	Silty sands, sand -silty mixtures
			"A" Limits plot above line and hatched zone on plasticity chart		SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more passes No. 200 Sieve)	SILTS Limits plot below "A" line or hatched zone on plasticity chart	SILTS OF LOW PLASTICITY (Liquid Limit More Than 50%)			ML	Inorganic silts, clayey silts with slight plasticity
		SILTS OF HIGH PLASTICITY (Liquid Limit More Than 50%)			MH	Inorganic silts, micaceous or diatomaceous silty soils, elastic silts
	CLAYS Limits plot above "A" line and hatched zone on plasticity chart	CLAYS OF LOW PLASTICITY (Liquid Limit More Than 50%)			CL	Inorganic clays of low to medium plasticity; gravelly clays, sandy clays, silty clays, lean clays
		CLAYS OF HIGH PLASTICITY (Liquid Limit More Than 50%)			CH	Inorganic clays of high plasticity, fat clays, sand clays of high plasticity

Note: Coarse grained soils with between 5% and 12% passing the No. 200 sieve and the grained soils with limits plotting in the hatched zone on the plasticity chart to have double symbol.

DEFINITIONS OF SOIL FRACTIONS

SOIL COMPONENT	PARTICLE SIZE RANGE
COBBLES	Above 3 inches
GRAVEL	3 Inches to No. 4 sieve
Coarse Gravel	3 inches to 3/4 inch
Fine Gravel	3/4 inch to No. 4 sieve
SAND	No. 4 sieve to No. 200
Coarse Gravel	No. 4 sieve to No. 10
Medium	No. 10 sieve to No. 40
Fine	No. 40 sieve to No. 200
FINE (Silt or Clay)	Below No. 200 sieve





Hole No. 10A2S-1

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth		SHEET 1 OF 1 SHEETS													
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons															
2. LOCATION(Coordinates or Station) N 31° 50' 59.8717" W 106° 21' 10.1465"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)															
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81															
4. HOLE NO.(As shown on drawing title and file number) 10A2S-1		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 5		DISTURBED 5 UNDISTURBED 0														
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES															
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry															
7. THICKNESS OF OVERBURDEN			16. DATE HOLE 2-2-10		STARTED COMPLETED 2-2-10													
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE 3935.05'															
9. TOTAL DEPTH OF HOLE 10'			18. TOTAL CORE RECOVERY FOR BORING %															
19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel																		
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g												
8.1	2		0.0' to 2.6' CLAYEY SAND (SC), Brown, Medium Plasticity, Damp		A	Caving after: 8' 5"												
	4		2.6' to 3.8' SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp															
5.4	6		3.8' to 7.2' POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry to Damp		B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10'												
	8		7.2' to 10.7' CLAYEY SAND (SC), Brown, Medium Plasticity, Dry to Damp															
	10		10.7' to 11.5' CLAYEY SAND (SC), Light Brown, Medium to High Plasticity, Damp			<u>Penetration Tests</u> <table><tr><td>Start Depth</td><td>Blow Counts</td></tr><tr><td>0.0'</td><td>5-6-8</td></tr><tr><td>2.5'</td><td>7-11-8</td></tr><tr><td>5.0'</td><td>4-5-3</td></tr><tr><td>7.5'</td><td>7-6-6</td></tr><tr><td>10.0'</td><td>7-9-32</td></tr></table>	Start Depth	Blow Counts	0.0'	5-6-8	2.5'	7-11-8	5.0'	4-5-3	7.5'	7-6-6	10.0'	7-9-32
Start Depth	Blow Counts																	
0.0'	5-6-8																	
2.5'	7-11-8																	
5.0'	4-5-3																	
7.5'	7-6-6																	
10.0'	7-9-32																	
	12																	



Hole No. 10A2S-2

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth		SHEET 1 OF 1 SHEETS															
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons																	
2. LOCATION (Coordinates or Station) N 31° 51' 00.7343" W 106° 21' 08.7077"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)																	
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81																	
4. HOLE NO. (As shown on drawing title and file number) 10A2S-2		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 5		DISTURBED 5																
5. NAME OF DRILLER Francisco Aguilar		14. TOTAL NUMBER CORE BOXES		UNDISTURBED 0																
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER Dry		16. DATE HOLE STARTED 2-1-10																
7. THICKNESS OF OVERBURDEN		17. ELEVATION TOP OF HOLE 3934.37'		COMPLETED 2-1-10																
8. DEPTH DRILLED INTO ROCK		18. TOTAL CORE RECOVERY FOR BORING		%																
9. TOTAL DEPTH OF HOLE 10'		19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel																		
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g														
12.1	2		0.0' to 2.8' CLAYEY SAND (SC), Brown, Medium Plasticity, Damp		A	Caving after: 8' 10"														
4.7	4		2.8' to 5.9' SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp		B															
5.8	6		5.9' to 7.7' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		C															
	8		7.7' to 10.7' POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry to Damp																	
	10		10.7' to 11.5' CLAYEY SAND (SC), Brown, Medium Plasticity, Damp																	
	12																			
<div>Penetration Tests</div> <table><tr><td>Start</td><td>Blow</td></tr><tr><td>Depth</td><td>Counts</td></tr><tr><td>0.0'</td><td>3-7-7</td></tr><tr><td>2.5'</td><td>3-4-4</td></tr><tr><td>5.0'</td><td>3-5-8</td></tr><tr><td>7.5'</td><td>7-8-8</td></tr><tr><td>10.0'</td><td>4-9-9</td></tr></table>							Start	Blow	Depth	Counts	0.0'	3-7-7	2.5'	3-4-4	5.0'	3-5-8	7.5'	7-8-8	10.0'	4-9-9
Start	Blow																			
Depth	Counts																			
0.0'	3-7-7																			
2.5'	3-4-4																			
5.0'	3-5-8																			
7.5'	7-8-8																			
10.0'	4-9-9																			



Hole No. 10A2S-3

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth		SHEET 1 OF 1 SHEETS															
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons																	
2. LOCATION (Coordinates or Station) N 31° 50' 58.5942" W 106° 21' 10.1130"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)																	
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81																	
4. HOLE NO. (As shown on drawing title and file number) 10A2S-3		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 5		DISTURBED 5 UNDISTURBED 0																
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES																	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry																	
7. THICKNESS OF OVERBURDEN			16. DATE HOLE 2-2-10		STARTED 2-2-10 COMPLETED 2-2-10															
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE 3936.40'																	
9. TOTAL DEPTH OF HOLE 10'			18. TOTAL CORE RECOVERY FOR BORING %																	
19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel																				
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g														
8.7	2		0.0' to 5.2' CLAYEY SAND (SC), Brown, Medium Plasticity, Damp		A	Caving after: 7' 10"														
	4		5.2' to 7.3' SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp																	
5.2	6		7.3' to 10.5' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Dry to Damp		B	Jar Samples A. 0' - 5' B. 5' - 10'														
	8		10.5' to 11.5' POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry to Damp																	
	10																			
	12																			
<div>Penetration Tests</div> <table><tr><td>Start</td><td>Blow</td></tr><tr><td>Depth</td><td>Counts</td></tr><tr><td>0.0'</td><td>3-5-8</td></tr><tr><td>2.5'</td><td>11-13-14</td></tr><tr><td>5.0'</td><td>6-11-16</td></tr><tr><td>7.5'</td><td>10-11-8</td></tr><tr><td>10.0'</td><td>6-4-4</td></tr></table>							Start	Blow	Depth	Counts	0.0'	3-5-8	2.5'	11-13-14	5.0'	6-11-16	7.5'	10-11-8	10.0'	6-4-4
Start	Blow																			
Depth	Counts																			
0.0'	3-5-8																			
2.5'	11-13-14																			
5.0'	6-11-16																			
7.5'	10-11-8																			
10.0'	6-4-4																			



Hole No. 10A2S-4

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth		SHEET 1 OF 1 SHEETS															
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons																	
2. LOCATION (Coordinates or Station) N 31° 50' 59.0954" W 106° 21' 08.8893"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)																	
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81																	
4. HOLE NO. (As shown on drawing title and file number) 10A2S-4		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 5		DISTURBED 5 UNDISTURBED 0																
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES																	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry																	
7. THICKNESS OF OVERBURDEN			16. DATE HOLE 2-9-10		STARTED 2-9-10 COMPLETED 2-9-10															
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE 3935.58'																	
9. TOTAL DEPTH OF HOLE 10'			18. TOTAL CORE RECOVERY FOR BORING %																	
19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel																				
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g														
14.9	2		0.0' to 3.4' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		A	Caving after: 9' 0"														
	4		3.4' to 6.3' SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp																	
5.9	6		6.3' to 11.5' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Dry to Damp		B	Jar Samples A. 0' - 5' B. 5' - 10'														
	8																			
	10																			
	12																			
<div>Penetration Tests</div> <table><tr><td>Start</td><td>Blow</td></tr><tr><td>Depth</td><td>Counts</td></tr><tr><td>0.0'</td><td>3-3-3</td></tr><tr><td>2.5'</td><td>3-3-7</td></tr><tr><td>5.0'</td><td>6-6-8</td></tr><tr><td>7.5'</td><td>7-8-6</td></tr><tr><td>10.0'</td><td>7-9-11</td></tr></table>							Start	Blow	Depth	Counts	0.0'	3-3-3	2.5'	3-3-7	5.0'	6-6-8	7.5'	7-8-6	10.0'	7-9-11
Start	Blow																			
Depth	Counts																			
0.0'	3-3-3																			
2.5'	3-3-7																			
5.0'	6-6-8																			
7.5'	7-8-6																			
10.0'	7-9-11																			



Hole No. 10A2S-5

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth		SHEET 1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center – Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 57.3551" W 106° 21' 09.0948"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 10A2S-5		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 5		DISTURBED 5 UNDISTURBED 0		
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry			
7. THICKNESS OF OVERBURDEN			16. DATE HOLE 2-9-10		STARTED 2-9-10 COMPLETED 2-9-10	
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE 3936.11'			
9. TOTAL DEPTH OF HOLE 10'			18. TOTAL CORE RECOVERY FOR BORING %			
19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel						

MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
10.2	2		0.0' to 3.8' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		A	Caving after: 8' 11"
	4		3.8' to 7.2' SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp			
6.7	6		7.2' to 11.5' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10'
	8					
	10					
	12					

Penetration Tests

Start Depth	Blow Counts
0.0'	3-3-5
2.5'	8-8-10
5.0'	7-11-11
7.5'	11-11-9
10.0'	9-7-5



Hole No. 10A2S-6

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth		SHEET 1 OF 1 SHEETS															
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons																	
2. LOCATION (Coordinates or Station) N 31° 50' 55.6850" W 106° 21' 08.4583"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)																	
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81																	
4. HOLE NO. (As shown on drawing title and file number) 10A2S-6		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 5		DISTURBED 5 UNDISTURBED 0																
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES																	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry																	
7. THICKNESS OF OVERBURDEN			16. DATE HOLE 2-9-10		STARTED 2-9-10 COMPLETED 2-9-10															
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE 3932.87'																	
9. TOTAL DEPTH OF HOLE 10'			18. TOTAL CORE RECOVERY FOR BORING %																	
19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel																				
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g														
6.2	2		0.0' to 3.8' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Dry to Damp		A	Caving after: 9' 5"														
	4		3.8' to 4.9' SILTY CLAYEY SAND (SC-SM), Brown, Low Plasticity, Damp																	
6.1	6		4.9' to 10.3' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Dry to Damp		B	Jar Samples A. 0' - 5' B. 5' - 10'														
	8		10.3' to 11.5' POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry																	
	10																			
	12																			
<div>Penetration Tests</div> <table><tr><td>Start</td><td>Blow</td></tr><tr><td>Depth</td><td>Counts</td></tr><tr><td>0.0'</td><td>4-7-8</td></tr><tr><td>2.5'</td><td>5-5-6</td></tr><tr><td>5.0'</td><td>5-6-6</td></tr><tr><td>7.5'</td><td>13-12-8</td></tr><tr><td>10.0'</td><td>5-3-3</td></tr></table>							Start	Blow	Depth	Counts	0.0'	4-7-8	2.5'	5-5-6	5.0'	5-6-6	7.5'	13-12-8	10.0'	5-3-3
Start	Blow																			
Depth	Counts																			
0.0'	4-7-8																			
2.5'	5-5-6																			
5.0'	5-6-6																			
7.5'	13-12-8																			
10.0'	5-3-3																			



International Inc.

Hole No. 10A2S-7

DRILLING LOG		DIVISION	INSTALLATION	SHEET	
		SWD	Ft. Worth	1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons		
2. LOCATION (Coordinates or Station) N 31° 50' 56.1727" W 106° 21' 06.9577"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)		
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81		
4. HOLE NO. (As shown on drawing title and file number) 10A2S-7			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 5		
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES 0		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry		
7. THICKNESS OF OVERBURDEN			16. DATE HOLE 2-9-10		
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE 3934.14'		
9. TOTAL DEPTH OF HOLE 10'			18. TOTAL CORE RECOVERY FOR BORING %		
19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel					

MOISTURE	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	f	g
8.8	2		0.0' to 3.2' CLAYEY SAND (SC), Brown, Medium Plasticity, Damp		A	Caving after: 9' 6"
	4		3.2' to 5.2' SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp			
7.0	6		5.2' to 7.2' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Dry to Damp		B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10'
	8		7.2' to 9.9' CLAYEY SAND (SC) with caliche, Light Brown with White, Medium Plasticity, Dry to Damp			
	10		9.9' to 11.5' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp			
	12					

Penetration Tests	
Start Depth	Blow Counts
0.0'	3-5-10
2.5'	5-11-9
5.0'	5-6-5
7.5'	19-25-16
10.0'	8-9-10



Hole No. 10A2S-8

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth		SHEET 1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 54.9224" W 106° 21' 06.9678"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 10A2S-8		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 5		DISTURBED 5 UNDISTURBED 0		
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry			
7. THICKNESS OF OVERBURDEN			16. DATE HOLE 2-9-10		STARTED 2-9-10 COMPLETED 2-9-10	
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE 3931.88'			
9. TOTAL DEPTH OF HOLE 10'			18. TOTAL CORE RECOVERY FOR BORING %			
19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel						

MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g												
9.9	2		0.0' to 0.5' SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp		A	Caving after: 8' 2"												
	4		0.5' to 4.9' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp															
7.9	6		4.9' to 6.3' SILTY CLAYEY SAND (SC-SM), Brown, Low Plasticity, Damp		B	Jar Samples A. 0' - 5' B. 5' - 10'												
	8		6.3' to 7.3' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp															
	10		7.3' to 11.5' POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry to Damp			Penetration Tests <table><thead><tr><th>Start Depth</th><th>Blow Counts</th></tr></thead><tbody><tr><td>0.0'</td><td>2-2-3</td></tr><tr><td>2.5'</td><td>5-5-5</td></tr><tr><td>5.0'</td><td>5-8-11</td></tr><tr><td>7.5'</td><td>4-3-4</td></tr><tr><td>10.0'</td><td>3-3-5</td></tr></tbody></table>	Start Depth	Blow Counts	0.0'	2-2-3	2.5'	5-5-5	5.0'	5-8-11	7.5'	4-3-4	10.0'	3-3-5
Start Depth	Blow Counts																	
0.0'	2-2-3																	
2.5'	5-5-5																	
5.0'	5-8-11																	
7.5'	4-3-4																	
10.0'	3-3-5																	
	12																	



Hole No. 8A2S-9

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth		SHEET 1 OF 1 SHEETS															
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons																	
2. LOCATION(Coordinates or Station) N 31° 50' 55.0247" W 106° 21' 14.2241"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)																	
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81																	
4. HOLE NO.(As shown on drawing title and file number)		8A2S-9																		
5. NAME OF DRILLER Francisco Aguilar			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN DISTURBED 5 UNDISTURBED 0																	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			14. TOTAL NUMBER CORE BOXES																	
7. THICKNESS OF OVERBURDEN			15. ELEVATION GROUND WATER Dry																	
8. DEPTH DRILLED INTO ROCK			16. DATE HOLE STARTED 1-22-10 COMPLETED 1-22-10																	
9. TOTAL DEPTH OF HOLE 10'			17. ELEVATION TOP OF HOLE 3937.74'																	
			18. TOTAL CORE RECOVERY FOR BORING %																	
			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel																	
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g														
10.0	2		0.0' to 4.0' CLAYEY SAND (SC), Light Brown, Medium to High Plasticity, Damp		A	Caving after: 7' 1"														
5.8	4		4.0' to 8.0' SILTY SAND (SM), Brown, Non-Plastic to Low Plasticity, Damp		B	Jar Samples														
14.4	8		8.0' to 11.5' SANDY FAT CLAY (CH) with caliche, Brown with White, High Plasticity, Damp		C	A. 0' - 2.5' B. 2.5' - 7.5' C. 7.5' - 10'														
	10																			
	12																			
<div>Penetration Tests</div> <table><tr><td>Start</td><td>Blow</td></tr><tr><td>Depth</td><td>Counts</td></tr><tr><td>0.0'</td><td>5-14-13</td></tr><tr><td>2.5'</td><td>7-11-13</td></tr><tr><td>5.0'</td><td>7-9-12</td></tr><tr><td>7.5'</td><td>4-9-11</td></tr><tr><td>10.0'</td><td>9-10-14</td></tr></table>							Start	Blow	Depth	Counts	0.0'	5-14-13	2.5'	7-11-13	5.0'	7-9-12	7.5'	4-9-11	10.0'	9-10-14
Start	Blow																			
Depth	Counts																			
0.0'	5-14-13																			
2.5'	7-11-13																			
5.0'	7-9-12																			
7.5'	4-9-11																			
10.0'	9-10-14																			



Hole No. 8A2S-10

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth		SHEET 1 OF 1 SHEETS															
1. PROJECT Indoor Aquatic Center - Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons																	
2. LOCATION(Coordinates or Station) N 31° 50' 55.5645" W 106° 21' 13.4721"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)																	
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81																	
4. HOLE NO.(As shown on drawing title and file number)		8A2S-10																		
5. NAME OF DRILLER Francisco Aguilar			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN DISTURBED 5 UNDISTURBED 0																	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			14. TOTAL NUMBER CORE BOXES																	
7. THICKNESS OF OVERBURDEN			15. ELEVATION GROUND WATER Dry																	
8. DEPTH DRILLED INTO ROCK			16. DATE HOLE STARTED 1-25-10 COMPLETED 1-25-10																	
9. TOTAL DEPTH OF HOLE 10'			17. ELEVATION TOP OF HOLE 3937.87'																	
			18. TOTAL CORE RECOVERY FOR BORING %																	
			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel																	
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g														
13.2	2		0.0' to 3.3' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		A	Caving after: 7' 10"														
	4		3.3' to 7.2' SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp																	
8.3	6		7.2' to 11.5' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		B															
	8																			
	10																			
	12																			
<div>Penetration Tests</div> <table><tr><td>Start</td><td>Blow</td></tr><tr><td>Depth</td><td>Counts</td></tr><tr><td>0.0'</td><td>2-3-6</td></tr><tr><td>2.5'</td><td>4-7-15</td></tr><tr><td>5.0'</td><td>6-5-6</td></tr><tr><td>7.5'</td><td>9-8-12</td></tr><tr><td>10.0'</td><td>4-8-11</td></tr></table>							Start	Blow	Depth	Counts	0.0'	2-3-6	2.5'	4-7-15	5.0'	6-5-6	7.5'	9-8-12	10.0'	4-8-11
Start	Blow																			
Depth	Counts																			
0.0'	2-3-6																			
2.5'	4-7-15																			
5.0'	6-5-6																			
7.5'	9-8-12																			
10.0'	4-8-11																			



International Inc.

Hole No. 8A2S-11

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth		SHEET 1 OF 1 SHEETS													
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons															
2. LOCATION (Coordinates or Station) N 31° 50' 54.2897" W 106° 21' 13.5014"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)															
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81															
4. HOLE NO. (As shown on drawing title and file number) 8A2S-11			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN DISTURBED 5 UNDISTURBED 0															
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES															
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry															
7. THICKNESS OF OVERBURDEN			16. DATE HOLE STARTED 1-22-10 COMPLETED 1-22-10															
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE 3937.64'															
9. TOTAL DEPTH OF HOLE 10'			18. TOTAL CORE RECOVERY FOR BORING %															
19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel																		
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g												
9.7	2		0.0' to 2.7' CLAYEY SAND (SC), Light Brown, Medium to High Plasticity, Damp		A	Caving after: 6' 3"												
5.6	4		2.7' to 9.8' CLAYEY SAND (SC), Brown, Medium Plasticity, Dry to Damp		B													
9.9	6		9.8' to 11.5' SANDY LEAN CLAY (CL), Dark Brown, Medium to High Plasticity, Damp		C													
	8																	
	10																	
	12																	
<p style="text-align: center;"><u>Penetration Tests</u></p> <table border="1"> <thead> <tr> <th>Start Depth</th> <th>Blow Counts</th> </tr> </thead> <tbody> <tr> <td>0.0'</td> <td>5-6-8</td> </tr> <tr> <td>2.5'</td> <td>5-12-10</td> </tr> <tr> <td>5.0'</td> <td>5-5-8</td> </tr> <tr> <td>7.5'</td> <td>8-12-10</td> </tr> <tr> <td>10.0'</td> <td>3-5-5</td> </tr> </tbody> </table>							Start Depth	Blow Counts	0.0'	5-6-8	2.5'	5-12-10	5.0'	5-5-8	7.5'	8-12-10	10.0'	3-5-5
Start Depth	Blow Counts																	
0.0'	5-6-8																	
2.5'	5-12-10																	
5.0'	5-5-8																	
7.5'	8-12-10																	
10.0'	3-5-5																	



International Inc.

Hole No. 8A2S-12

DRILLING LOG		DIVISION	INSTALLATION	SHEET	
		SWD	Ft. Worth	1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons		
2. LOCATION (Coordinates or Station) N 31° 50' 54.8302" W 106° 21' 12.7501"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)		
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81		
4. HOLE NO. (As shown on drawing title and file number) 8A2S-12		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 5		UNDISTURBED 0	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry		
7. THICKNESS OF OVERBURDEN			16. DATE HOLE 1-25-10		COMPLETED 1-25-10
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE 3937.77'		
9. TOTAL DEPTH OF HOLE 10'			18. TOTAL CORE RECOVERY FOR BORING %		
			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel		

MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
11.3	2		0.0' to 2.3' CLAYEY SAND (SC), Reddish Brown, Medium Plasticity, Damp		A	Caving after: 7' 4"
	4		2.3' to 7.2' SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp to Moist			
5.0	6		7.2' to 11.5' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		B	
	8					
	10					
	12					

Penetration Tests

Start Depth	Blow Counts
0.0'	3-3-6
2.5'	5-13-11
5.0'	4-6-6
7.5'	21-28-33
10.0'	15-16-12



Hole No. 8A2S-13

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth		SHEET 1 OF 1 SHEETS															
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons																	
2. LOCATION (Coordinates or Station) N 31° 50' 55.2112" W 106° 21' 12.2134"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)																	
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81																	
4. HOLE NO. (As shown on drawing title and file number) 8A2S-13		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 5		DISTURBED 5 UNDISTURBED 0																
5. NAME OF DRILLER Francisco Aguilar		14. TOTAL NUMBER CORE BOXES																		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER Dry																		
7. THICKNESS OF OVERBURDEN		16. DATE HOLE 2-1-10		STARTED 2-1-10 COMPLETED 2-1-10																
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE 3937.77'																		
9. TOTAL DEPTH OF HOLE 10'		18. TOTAL CORE RECOVERY FOR BORING %																		
19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel																				
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g														
11.3	2		0.0' to 2.4' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		A	Caving after: 8' 10"														
	4		2.4' to 7.3' SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp																	
5.1	6		7.3' to 11.5' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		B															
	8																			
	10																			
	12																			
<div>Penetration Tests</div> <table><tr><td>Start</td><td>Blow</td></tr><tr><td>Depth</td><td>Counts</td></tr><tr><td>0.0'</td><td>3-4-7</td></tr><tr><td>2.5'</td><td>12-16-16</td></tr><tr><td>5.0'</td><td>3-8-6</td></tr><tr><td>7.5'</td><td>9-10-10</td></tr><tr><td>10.0'</td><td>11-10-9</td></tr></table>							Start	Blow	Depth	Counts	0.0'	3-4-7	2.5'	12-16-16	5.0'	3-8-6	7.5'	9-10-10	10.0'	11-10-9
Start	Blow																			
Depth	Counts																			
0.0'	3-4-7																			
2.5'	12-16-16																			
5.0'	3-8-6																			
7.5'	9-10-10																			
10.0'	11-10-9																			



Hole No. 8A2S-14

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth		SHEET 1 OF 1 SHEETS														
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons																
2. LOCATION (Coordinates or Station) N 31° 50' 55.7780" W 106° 21' 12.7703"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)																
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81																
4. HOLE NO. (As shown on drawing title and file number) 8A2S-14		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 5		DISTURBED 5 UNDISTURBED 0															
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES																
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry																
7. THICKNESS OF OVERBURDEN			16. DATE HOLE 1-27-10		STARTED 1-27-10 COMPLETED 1-27-10														
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE 3937.89'																
9. TOTAL DEPTH OF HOLE 10'			18. TOTAL CORE RECOVERY FOR BORING %																
19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel																			
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d		% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g												
11.1	2		0.0' to 2.0' SILTY CLAYEY SAND (SC-SM), Reddish Brown, Low Plasticity, Damp			A	Caving after: 8' 8"												
	4		2.0' to 5.3' CLAYEY SAND (SC), Reddish Brown, Medium Plasticity, Damp																
5.4	6		5.3' to 11.5' SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp			B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10'												
	8																		
	10																		
	12																		
<u>Penetration Tests</u> <table><tr><td>Start Depth</td><td>Blow Counts</td></tr><tr><td>0.0'</td><td>3-4-5</td></tr><tr><td>2.5'</td><td>5-9-12</td></tr><tr><td>5.0'</td><td>5-11-11</td></tr><tr><td>7.5'</td><td>5-5-5</td></tr><tr><td>10.0'</td><td>6-5-6</td></tr></table>							Start Depth	Blow Counts	0.0'	3-4-5	2.5'	5-9-12	5.0'	5-11-11	7.5'	5-5-5	10.0'	6-5-6	
Start Depth	Blow Counts																		
0.0'	3-4-5																		
2.5'	5-9-12																		
5.0'	5-11-11																		
7.5'	5-5-5																		
10.0'	6-5-6																		



International Inc.

Hole No. 8A2S-15

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 55.6171" W 106° 21' 13.8599"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-15			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11		UNDISTURBED 1	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
			15. ELEVATION GROUND WATER Dry			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			16. DATE HOLE STARTED 1-25-10		COMPLETED 1-25-10	
7. THICKNESS OF OVERBURDEN			17. ELEVATION TOP OF HOLE 3937.84'			
8. DEPTH DRILLED INTO ROCK			18. TOTAL CORE RECOVERY FOR BORING %			
9. TOTAL DEPTH OF HOLE 25'			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			

MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
10.3	2		<u>0.0' to 2.4'</u> CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		A	Caving after: 17" 2"
6.8	4		<u>2.4' to 7.2'</u> SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp		B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10' C. 10' - 15' D. 15' - 20' E. 20' - 25'
11.5	6		<u>7.2' to 12.2'</u> FAT CLAY (CH) with sand, Brown, High Plasticity, Damp to Moist		C	<u>Shelby Tube (9' - 11.5')</u> Depth (11'-11.5') Natural Density = 129.5 pcf Dry Density = 111.1 pcf
1.7	8		<u>12.2' to 23.4'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry		D	<u>Penetration Tests</u> Start Blow <u>Depth</u> <u>Counts</u> 0.0' 4-5-8 2.5' 8-9-12 5.0' 5-5-6 7.5' 7-9-11 10.0' ST 12.5' 4-5-7 15.0' 5-6-9 17.5' 5-8-10 20.0' 7-10-13 22.5' 19-50+@5" 25.0' 45-50+@4"
2.9	10		<u>23.4' to 26.5'</u> LEAN CLAY (CL) with caliche, Brown with White, Medium to High Plasticity, Damp		E	
	12					
	14					
	16					
	18					
	20					
	22					
	24					
	26					
	28					



International Inc.

Hole No. 8A2S-16

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 55.97.80" W 106° 21' 13.8234"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-16			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11		UNDISTURBED 0	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
			15. ELEVATION GROUND WATER Dry			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			16. DATE HOLE STARTED 1-25-10		COMPLETED 1-25-10	
7. THICKNESS OF OVERBURDEN			17. ELEVATION TOP OF HOLE 3937.78'			
8. DEPTH DRILLED INTO ROCK			18. TOTAL CORE RECOVERY FOR BORING %			
9. TOTAL DEPTH OF HOLE 25'			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
10.9	2		<u>0.0' to 3.9'</u> CLAYEY SAND (SC), Reddish Brown, Medium Plasticity, Damp		A	Caving after: 17" 2"
	4		<u>3.9' to 7.2'</u> SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp to Moist			<u>Jar Samples</u>
9.0	6					A. 0' - 5'
	8		<u>7.2' to 9.5'</u> SANDY FAT CLAY (CH), Light Brown with White, High Plasticity, Damp		B	B. 5' - 10'
	10					C. 10' - 15'
16.1	12		<u>9.5' to 12.6'</u> SANDY LEAN CLAY (CL), Brown, Medium to High Plasticity, Damp to Moist		C	D. 15' - 20'
	14		<u>12.6' to 23.4'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry			E. 20' - 25'
	16					<u>Penetration Tests</u>
1.8	18		<u>23.4' to 26.5'</u> LEAN CLAY (CL) with caliche, Brown with White, High Plasticity, Damp to Moist		D	Start Depth
	20					Blow Counts
	22					0.0' 5-6-9
	24					2.5' 8-9-14
1.8	26				E	5.0' 4-5-4
	28					7.5' 3-8-9
						10.0' 6-9-13
						12.5' 4-6-9
						15.0' 3-6-7
						17.5' 5-8-11
						20.0' 5-10-13
						22.5' 7-50+@5"
						25.0' 31-31-30



International Inc.

Hole No. 8A2S-17

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 55.4278" W 106° 21' 12.1230"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-17			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11		UNDISTURBED 0	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
			15. ELEVATION GROUND WATER Dry			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			16. DATE HOLE STARTED 2-1-10		COMPLETED 2-1-10	
7. THICKNESS OF OVERBURDEN			17. ELEVATION TOP OF HOLE 3937.64'			
8. DEPTH DRILLED INTO ROCK			18. TOTAL CORE RECOVERY FOR BORING %			
9. TOTAL DEPTH OF HOLE 25'			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
11.0	2		<u>0.0' to 2.6'</u> CLAYEY SAND (SC), Reddish Brown, Medium Plasticity, Damp		A	Caving after: 19' 6"
	4		<u>2.6' to 7.2'</u> SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp			
6.4	6		<u>7.2' to 11.1'</u> CLAYEY SAND (SC), Light Brown, Medium Plasticity, Dry to Damp		B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10' C. 10' - 15' D. 15' - 20' E. 20' - 25'
6.2	8		<u>11.1' to 22.3'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry to Damp		C	
	10		<u>22.3' to 26.5'</u> LEAN CLAY (CL) with caliche, Brown with White, Medium to High Plasticity, Damp to Moist			
2.0	12				D	<u>Penetration Tests</u> Start Blow Depth Counts 0.0' 3-5-7 2.5' 9-13-17 5.0' 6-12-10 7.5' 13-12-9 10.0' 5-5-4 12.5' 3-4-6 15.0' 5-7-8 17.5' 8-10-12 20.0' 7-13-16 22.5' 20-27-27 25.0' 17-22-22
1.8	14				E	
	16					
	18					
	20					
	22					
	24					
	26					
	28					



International Inc.

Hole No. 8A2S-18

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 55.6180" W 106° 21' 11.8559"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-18			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11		UNDISTURBED 0	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
			15. ELEVATION GROUND WATER Dry			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			16. DATE HOLE STARTED 2-1-10		COMPLETED 2-1-10	
7. THICKNESS OF OVERBURDEN			17. ELEVATION TOP OF HOLE 3937.79'			
8. DEPTH DRILLED INTO ROCK			18. TOTAL CORE RECOVERY FOR BORING %			
9. TOTAL DEPTH OF HOLE 25'			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
11.6	2		<u>0.0' to 2.8'</u> CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		A	Caving after: 20' 6"
	4		<u>2.8' to 7.2'</u> SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp			
7.4	6		<u>7.2' to 12.4'</u> CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10' C. 10' - 15' D. 15' - 20' E. 20' - 25'
	8		<u>12.4' to 22.3'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry to Damp		C	
9.2	10		<u>22.3' to 26.5'</u> SANDY LEAN CLAY (CL) with caliche, Brown with White, Medium to High Plasticity, Damp			
	12					
2.8	14				D	<u>Penetration Tests</u> Start Blow Depth Counts 0.0' 4-6-8 2.5' 9-13-15 5.0' 6-12-16 7.5' 18-24-19 10.0' 19-20-15 12.5' 3-4-5 15.0' 5-5-8 17.5' 7-12-13 20.0' 6-11-13 22.5' 15-27-33 25.0' 16-25-28
	16					
	18					
	20					
2.2	22				E	
	24					
	26					
	28					



International Inc.

Hole No. 8A2S-19

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 56.2880" W 106° 21' 11.9596"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-19			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11		UNDISTURBED 1	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry		16. DATE HOLE STARTED 2-2-10 COMPLETED 2-2-10	
7. THICKNESS OF OVERBURDEN			17. ELEVATION TOP OF HOLE 3937.84'			
8. DEPTH DRILLED INTO ROCK			18. TOTAL CORE RECOVERY FOR BORING %			
9. TOTAL DEPTH OF HOLE 25'			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			

MOISTURE	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	f	g
11.0	2		<u>0.0' to 2.4'</u> CLAYEY SAND (SC), Brown, Medium Plasticity, Damp		A	Caving after: 18' 6"
	4		<u>2.4' to 3.9'</u> SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp			<u>Jar Samples</u>
4.7	6		<u>3.9' to 7.6'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry to Damp		B	A. 0' - 5' B. 5' - 10' C. 10' - 15' D. 15' - 20' E. 20' - 25'
	8		<u>7.6' to 12.3'</u> CLAYEY SAND (SC), Light Brown, High Plasticity, Dry			<u>Shelby Tube (9.5' - 12')</u> Depth (11.5' - 12') Natural Density = 114.8 pcf Dry Density = 108.7 pcf
7.1	10		<u>12.3' to 20.2'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry to Damp		C	
	12		<u>20.2' to 22.4'</u> POORLY GRADED SAND (SP), Light Gray, Non-Plastic, Dry			<u>Penetration Tests</u>
2.8	14		<u>22.4' to 26.5'</u> SANDY LEAN CLAY (CL) with caliche, Brown with White, Medium to High Plasticity, Damp		D	Start Depth Blow Counts 0.0' 2-4-6 2.5' 10-14-13 5.0' 7-7-7 7.5' 9-9-7 10.0' ST 12.5' 7-4-4 15.0' 3-4-6 17.5' 5-11-16 20.0' 8-14-17 22.5' 28-28-30 25.0' 14-27-29
	16					
	18					
	20					
1.8	22				E	
	24					
	26					
	28					



International Inc.

Hole No. 8A2S-20

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 56.5267" W 106° 21' 12.1949"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-20			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11		UNDISTURBED 0	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry		16. DATE HOLE STARTED 2-2-10 COMPLETED 2-2-10	
7. THICKNESS OF OVERBURDEN			17. ELEVATION TOP OF HOLE 3937.79'			
8. DEPTH DRILLED INTO ROCK			18. TOTAL CORE RECOVERY FOR BORING %			
9. TOTAL DEPTH OF HOLE 25'			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			

MOISTURE	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	f	g
11.0	2		0.0' to 3.6' CLAYEY SAND (SC), Brown, Medium Plasticity, Damp		A	Caving after: 19' 8"
	4					
3.3	6		3.6' to 4.9' SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp		B	Jar Samples A. 0' - 5' B. 5' - 10' C. 10' - 15' D. 15' - 20' E. 20' - 25'
	8					
9.7	10		4.9' to 8.0' POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry to Damp		C	
	12					
3.2	14		8.0' to 10.4' CLAYEY SAND (SC), Brown, Medium Plasticity, Damp		D	Penetration Tests Start Depth Blow Counts 0.0' 3-4-5 2.5' 5-9-12 5.0' 6-9-11 7.5' 4-6-6 10.0' 6-8-11 12.5' 12-11-10 15.0' 6-7-7 17.5' 7-9-12 20.0' 6-13-16 22.5' 16-25-25 25.0' 11-22-26
	16					
2.8	18		10.4' to 13.7' CLAYEY SAND (SC), Light Brown, Medium to High Plasticity, Damp		E	
	20					
	22		13.7' to 22.3' POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry to Damp			
	24					
	26		22.3' to 26.5' LEAN CLAY (CL) with caliche, Brown with White, Medium to High Plasticity, Damp			
	28					



International Inc.

Hole No. 8A2S-21

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 55.9615" W 106° 21' 12.1928"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-21			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11		UNDISTURBED 0	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
			15. ELEVATION GROUND WATER Dry			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			16. DATE HOLE STARTED 2-2-10		COMPLETED 2-2-10	
7. THICKNESS OF OVERBURDEN			17. ELEVATION TOP OF HOLE 3937.74'			
8. DEPTH DRILLED INTO ROCK			18. TOTAL CORE RECOVERY FOR BORING %			
9. TOTAL DEPTH OF HOLE 25'			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
11.0	2		<u>0.0' to 4.8'</u> CLAYEY SAND (SC), Brown, Medium Plasticity, Damp		A	Caving after: 18' 6"
	4					
4.2	6		<u>4.8' to 7.2'</u> SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp		B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10' C. 10' - 15' D. 15' - 20' E. 20' - 25'
	8					
	10		<u>7.2' to 12.4'</u> CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp			
	12					
7.7	14		<u>12.4' to 22.4'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry to Damp		C	
	16					
2.8	18		<u>22.4' to 26.5'</u> LEAN CLAY (CL) with caliche, Brown with White, Medium to High Plasticity, Damp		D	<u>Penetration Tests</u> Start Blow Depth Counts 0.0' 2-6-8 2.5' 6-8-10 5.0' 7-9-9 7.5' 12-20-16 10.0' 11-9-9 12.5' 4-6-6 15.0' 4-7-9 17.5' 8-12-15 20.0' 6-14-18 22.5' 15-35-36 25.0' 13-30-27
	20					
2.2	22				E	
	24					
	26					
	28					



International Inc.

Hole No. 8A2S-22

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 55.7708" W 106° 21' 12.4560"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-22			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11		UNDISTURBED 1	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
			15. ELEVATION GROUND WATER Dry			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			16. DATE HOLE STARTED 2-1-10		COMPLETED 2-1-10	
7. THICKNESS OF OVERBURDEN			17. ELEVATION TOP OF HOLE 3937.66'			
8. DEPTH DRILLED INTO ROCK			18. TOTAL CORE RECOVERY FOR BORING %			
9. TOTAL DEPTH OF HOLE 25'			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			

MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
11.1	2		<u>0.0' to 4.8'</u> CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		A	Caving after: 18' 2"
	4		<u>4.8' to 7.8'</u> SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp			
6.5	6		<u>7.8' to 12.4'</u> CLAYEY SAND (SC), Light Brown, High Plasticity, Dry to Damp		B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10' C. 10' - 15' D. 15' - 20' E. 20' - 25'
	8		<u>12.4' to 23.1'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry to Damp			
10.1	10		<u>23.1' to 26.5'</u> LEAN CLAY (CL) with caliche, Brown with White, Medium to High Plasticity, Damp		C	<u>Shelby Tube (7.5' - 10')</u> Depth (9.5' - 10') Natural Density = 112.8 pcf Dry Density = 105.5 pcf
	12					
1.8	14				D	<u>Penetration Tests</u> Start Blow Depth Counts 0.0' 3-4-7 2.5' 6-7-9 5.0' 7-10-10 7.5' ST 10.0' 5-12-14 12.5' 3-5-6 15.0' 6-8-9 17.5' 4-7-10 20.0' 7-11-14 22.5' 14-50+@3" 25.0' 27-37-25
	16					
2.2	18				E	
	20					
	22					
	24					
	26					
	28					



International Inc.

Hole No. 8A2S-23

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 55.8420" W 106° 21' 13.1513"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-23			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11		UNDISTURBED 0	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
			15. ELEVATION GROUND WATER Dry			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			16. DATE HOLE STARTED 2-1-10		COMPLETED 2-1-10	
7. THICKNESS OF OVERBURDEN			17. ELEVATION TOP OF HOLE 3937.82'			
8. DEPTH DRILLED INTO ROCK			18. TOTAL CORE RECOVERY FOR BORING %			
9. TOTAL DEPTH OF HOLE 25'			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
12.1	2		<u>0.0' to 3.9'</u> CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		A	Caving after: 18' 3"
	4		<u>3.9' to 4.8'</u> SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp			
5.5	6		<u>4.8' to 7.3'</u> POORLY GRADED SAND (SP-SM) with silt, Reddish Brown, Non-Plastic, Dry to Damp		B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10' C. 10' - 15' D. 15' - 20' E. 20' - 25'
	8		<u>7.3' to 12.4'</u> CLAYEY SAND (SC), Light Brown, Medium to High Plasticity, Damp		C	
8.6	12		<u>12.4' to 22.7'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry			
	14		<u>22.7' to 26.5'</u> SANDY LEAN CLAY (CL) with caliche, Brown with White, Medium to High Plasticity, Damp		D	<u>Penetration Tests</u> Start Blow Depth Counts 0.0' 3-4-5 2.5' 2-8-10 5.0' 6-9-8 7.5' 6-15-15 10.0' 8-13-10 12.5' 3-5-6 15.0' 2-4-6 17.5' 6-9-11 20.0' 6-9-11 22.5' 20-50+@4" 25.0' 47-50+@5"
2.2	16					
	18					
	20					
1.9	22				E	
	24					
	26					
	28					



International Inc.

Hole No. 8A2S-24

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 56.2060" W 106° 21' 12.6395"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-24			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11		UNDISTURBED 0	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
			15. ELEVATION GROUND WATER Dry			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			16. DATE HOLE STARTED 2-2-10		COMPLETED 2-2-10	
7. THICKNESS OF OVERBURDEN			17. ELEVATION TOP OF HOLE 3937.65'			
8. DEPTH DRILLED INTO ROCK			18. TOTAL CORE RECOVERY FOR BORING %			
9. TOTAL DEPTH OF HOLE 25'			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
11.5	2		<u>0.0' to 3.9'</u> CLAYEY SAND (SC), Brown, Medium Plasticity, Damp		A	Caving after: 20' 1"
	4		<u>3.9' to 4.8'</u> SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp			<u>Jar Samples</u>
	6					A. 0' - 5'
5.4	8		<u>4.8' to 7.1'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry to Damp		B	B. 5' - 10'
	10		<u>7.1' to 9.8'</u> CLAYEY SAND (SC), Light Brown, Medium Plasticity, Dry to Damp			C. 10' - 15'
15.0	12		<u>9.8' to 12.7'</u> CLAYEY SAND (SC), Light Brown, Medium to High Plasticity, Damp		C	D. 15' - 20'
	14					E. 20' - 25
2.2	16		<u>12.7' to 22.2'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry to Damp		D	<u>Penetration Tests</u>
	18					Start Blow Depth Counts
	20		<u>22.2' to 26.5'</u> SANDY LEAN CLAY (CL) with caliche, Brown with White, Medium to High Plasticity, Damp			0.0' 4-4-7
2.0	22				E	2.5' 7-9-11
	24					5.0' 7-11-9
	26					7.5' 10-11-10
	28					10.0' 11-10-10
						12.5' 6-7-7
						15.0' 6-8-10
						17.5' 5-10-14
						20.0' 9-15-20
						22.5' 27-29-35
						25.0' 17-30-33



International Inc.

Hole No. 8A2S-25

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 56.4910" W 106° 21' 13.2879"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-25			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 13		UNDISTURBED 1	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry			
7. THICKNESS OF OVERBURDEN			16. DATE HOLE STARTED 1-27-10 COMPLETED 1-27-10			
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE 3937.82'			
9. TOTAL DEPTH OF HOLE 30'			18. TOTAL CORE RECOVERY FOR BORING %			
			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			

MOISTURE	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	f	g
10.5	2		<u>0.0' to 2.8'</u> CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		A	Caving after: 25' 2"
	4		<u>2.8' to 5.3'</u> SILTY CLAYEY SAND (SC-SM), Reddish Brown, Low Plasticity, Damp			<u>Jar Samples</u>
5.1	6		<u>5.3' to 7.3'</u> SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp		B	A. 0' - 5' B. 5' - 10' C. 10' - 15' D. 15' - 20' E. 20' - 25' F. 25' - 30'
	8		<u>7.3' to 12.2'</u> CLAYEY SAND (SC), Brown, High Plasticity, Damp			
10.5	10		<u>12.2' to 22.8'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry		C	<u>Shelby Tube (9' - 11.5')</u> Depth (10.8' - 11.3') Natural Density = 112.1 pcf Dry Density = 103.1 pcf
	12		<u>22.8' to 25.2'</u> SANDY LEAN CLAY (CL) with caliche, Brown with White, High Plasticity, Damp		D	<u>Penetration Tests</u>
2.6	14		<u>25.2' to 30.1'</u> FAT CLAY (CH), Dark Brown, High Plasticity, Damp to Moist			Start Depth
	16		<u>30.1' to 31.5'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Damp		E	Blow Counts
2.7	18					0.0' 4-6-9
	20					2.5' 11-12-14
	22					5.0' 5-8-10
	24					7.5' 6-7-11
	26					10.0' ST
	28					12.5' 6-5-5
	30					15.0' 4-5-8
	32					17.5' 6-16-24
						20.0' 23-13-16
						22.5' 20-50+@5"
						25.0' 26-26-24
						27.5' 14-16-28
						30.0' 21-25-24



International Inc.

Hole No. 8A2S-26

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 57.0291" W 106° 21' 12.5402"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-26			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 13		UNDISTURBED 0	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
			15. ELEVATION GROUND WATER Dry			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			16. DATE HOLE STARTED 1-28-10		COMPLETED 1-28-10	
7. THICKNESS OF OVERBURDEN			17. ELEVATION TOP OF HOLE 3937.76'			
8. DEPTH DRILLED INTO ROCK			18. TOTAL CORE RECOVERY FOR BORING %			
9. TOTAL DEPTH OF HOLE 30'			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			

MOISTURE	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	f	g
12.1	2		<u>0.0' to 2.4'</u> CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		A	Caving after: 24' 1"
	4		<u>2.4' to 5.1'</u> SILTY CLAYEY SAND (SC-SM), Brown, Low Plasticity, Damp			
6.5	6		<u>5.1' to 7.5'</u> CLAYEY SAND (SC), Brown, Medium Plasticity, Dry to Damp		B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10' C. 10' - 15' D. 15' - 20' E. 20' - 25' F. 25' - 30'
	8		<u>7.5' to 13.0'</u> CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp			
12.0	10		<u>13.0' to 18.7'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry		C	
	12		<u>18.7' to 24.8'</u> POORLY GRADED SAND (SP-SM) with silt and caliche, Light Brown with White, Non-Plastic, Dry to Damp		D	<u>Penetration Tests</u> Start Depth Blow Counts 0.0' 4-5-6 2.5' 8-10-13 5.0' 6-10-11 7.5' 4-7-10 10.0' 8-7-8 12.5' 9-6-6 15.0' 3-5-7 17.5' 4-8-26 20.0' 34-31-41 22.5' 19-35-30 25.0' 19-28-34 27.5' 13-17-19 30.0' 16-17-33
2.2	14		<u>24.8' to 27.9'</u> SANDY LEAN CLAY (CL), Brown, Medium to High Plasticity, Damp			
	16		<u>27.9' to 31.5'</u> FAT CLAY (CH), Brown, High Plasticity, Damp to Moist			
	18					
3.6	20				E	
	22					
	24				F	
7.8	26					
	28					
	30					
	32					



International Inc.

Hole No. 8A2S-27

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 57.0774" W 106° 21' 13.2356"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-27			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 13		UNDISTURBED 0	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
			15. ELEVATION GROUND WATER Dry			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			16. DATE HOLE STARTED 1-27-10		COMPLETED 1-27-10	
7. THICKNESS OF OVERBURDEN			17. ELEVATION TOP OF HOLE 3937.83'			
8. DEPTH DRILLED INTO ROCK			18. TOTAL CORE RECOVERY FOR BORING %			
9. TOTAL DEPTH OF HOLE 30'			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			

MOISTURE	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	f	g
10.4	2		<u>0.0' to 2.6'</u> CLAYEY SAND (SC), Brown, Medium Plasticity, Damp		A	Caving after: 23' 1"
	4		<u>2.6' to 12.2'</u> SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp			
4.1	6		<u>12.2' to 17.1'</u> SANDY LEAN CLAY (CL), Light Brown, High Plasticity, Dry to Damp		B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10' C. 10' - 15' D. 15' - 20' E. 20' - 25' F. 25' - 30'
	8		<u>17.1' to 22.4'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry			
7.1	10		<u>22.4' to 31.5'</u> LEAN CLAY (CL) with caliche, Brown with White, High Plasticity, Dry to Damp		C	
	12					
7.6	14				D	<u>Penetration Tests</u> Start Blow Depth Counts 0.0' 3-5-6 2.5' 7-14-15 5.0' 9-9-8 7.5' 9-12-11 10.0' 9-12-12 12.5' 10-16-14 15.0' 16-21-18 17.5' 5-10-14 20.0' 5-12-15 22.5' 25-33-35 25.0' 20-29-29 27.5' 18-24-35 30.0' 27-50+@5"
	16					
2.2	18				E	
	20					
	22					
	24					
5.4	26				F	
	28					
	30					
	32					



International Inc.

Hole No. 8A2S-28

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 55.4499" W 106° 21' 12.7837"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-28			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 13		UNDISTURBED 0	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
			15. ELEVATION GROUND WATER Dry			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			16. DATE HOLE STARTED 1-26-10		COMPLETED 1-26-10	
7. THICKNESS OF OVERBURDEN			17. ELEVATION TOP OF HOLE 3938.23'			
8. DEPTH DRILLED INTO ROCK			18. TOTAL CORE RECOVERY FOR BORING %			
9. TOTAL DEPTH OF HOLE 30'			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			

MOISTURE	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	f	g
11.6	2		<u>0.0' to 2.8'</u> CLAYEY SAND (SC), Brown, Medium Plasticity, Damp		A	Caving after: 23' 8"
	4		<u>2.8' to 7.4'</u> SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp			
4.9	6		<u>7.4' to 11.3'</u> CLAYEY SAND (SC), Light Brown, High Plasticity, Dry		B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10' C. 10' - 15' D. 15' - 20' E. 20' - 25' F. 25' - 30'
	8		<u>11.3' to 12.3'</u> SANDY LEAN CLAY (CL), Brown, Medium Plasticity, Damp			
6.9	10		<u>12.3' to 22.5'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry		C	
	12		<u>22.5' to 25.1'</u> SANDY LEAN CLAY (CL) with caliche, Light Brown, High Plasticity, Damp			
1.9	14		<u>25.1' to 31.5'</u> LEAN CLAY (CL), Brown, High Plasticity, Damp		D	<u>Penetration Tests</u> Start Depth 0.0' 3-5-5 2.5' 5-12-17 5.0' 7-8-7 7.5' 11-14-11 10.0' 9-8-11 12.5' 3-6-7 15.0' 5-8-11 17.5' 5-7-11 20.0' 11-18-22 22.5' 50+@5" 25.0' 14-20-22 27.5' 13-16-22 30.0' 16-18-38
	16					
2.5	18				E	
	20					
8.0	22				F	
	24					
	26					
	28					
	30					
	32					



International Inc.

Hole No. 8A2S-29

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center — Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 55.2206" W 106° 21' 12.5591"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-29			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 13		UNDISTURBED 0	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
			15. ELEVATION GROUND WATER Dry			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			16. DATE HOLE STARTED 1-26-10		COMPLETED 1-26-10	
7. THICKNESS OF OVERBURDEN			17. ELEVATION TOP OF HOLE 3938.00'			
8. DEPTH DRILLED INTO ROCK			18. TOTAL CORE RECOVERY FOR BORING %			
9. TOTAL DEPTH OF HOLE 30'			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
10.1	2		<u>0.0' to 2.3'</u> CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		A	Caving after: 24' 2"
	4		<u>2.3' to 7.2'</u> SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp			
5.2	6		<u>7.2' to 12.4'</u> CLAYEY SAND (SC), Light Brown, Medium Plasticity, Dry to Damp		B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10' C. 10' - 15' D. 15' - 20' E. 20' - 25' F. 25' - 30'
	8		<u>12.4' to 22.3'</u> POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry			
7.5	10		<u>22.3' to 24.9'</u> SANDY LEAN CLAY (CL) with caliche, Light Brown with White, High Plasticity, Dry to Damp		C	
	12		<u>24.9' to 31.5'</u> SANDY LEAN CLAY (CL), Light Brown, High Plasticity, Dry to Damp			
2.2	14				D	<u>Penetration Tests</u> Start Blow Depth Counts 0.0' 4-4-6 2.5' 8-15-17 5.0' 7-9-9 7.5' 9-10-8 10.0' 7-8-9 12.5' 3-2-2 15.0' 2-4-6 17.5' 3-7-7 20.0' 7-10-12 22.5' 50+@5" 25.0' 18-17-29 27.5' 9-17-26 30.0' 13-14-23
	16					
	18					
	20					
2.1	22				E	
	24					
	26					
6.7	28				F	
	30					
	32					



International Inc.

Hole No. 8A2S-30

DRILLING LOG		DIVISION	INSTALLATION	Ft. Worth		SHEET 1 OF 1 SHEETS
1. PROJECT Indoor Aquatic Center - Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 57.6009" W 106° 21' 11.8800"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-30			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 17		UNDISTURBED 0	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry			
7. THICKNESS OF OVERBURDEN			16. DATE HOLE STARTED 1-27-10		COMPLETED 1-27-10	
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE 3937.68'			
9. TOTAL DEPTH OF HOLE 40'			18. TOTAL CORE RECOVERY FOR BORING %			
			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			
MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
10.9	2		0.0' to 4.9' CLAYEY SAND (SC), Light Brown to Brown, Medium Plasticity, Damp		A	Caving after: 34' 6"
	4		4.9' to 7.2' SILTY SAND (SM), Reddish Brown, Non-Plastic, Dry to Damp			
3.3	6		7.2' to 12.2' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Dry		B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10' C. 10' - 15' D. 15' - 20' E. 20' - 25' F. 25' - 30' G. 30' - 35' H. 35' - 40'
	8		12.2' to 21.1' POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry to Damp			
7.1	10		21.1' to 24.8' FAT CLAY (CH) with caliche, Brown with White, High Plasticity, Moist		C	
	12		24.8' to 27.3' SANDY LEAN CLAY (CL), Brown, Medium to High Plasticity, Damp			
2.8	14		27.3' to 30.9' FAT CLAY (CH), Dark Brown, High Plasticity, Damp to Moist		D	<u>Penetration Tests</u> Start Blow Depth Counts 0.0' 4-5-8 2.5' 7-10-12 5.0' 8-13-20 7.5' 8-13-16 10.0' 12-13-10 12.5' 5-4-5 15.0' 4-5-8 17.5' 5-10-12 20.0' 8-9-18 22.5' 20-27-37 25.0' 16-17-22 27.5' 11-14-24 30.0' 10-22-28 32.5' 9-19-33 35.0' 25-33-35 37.5' 11-28-37 40.0' 16-35-42
	16		30.9' to 33.6' POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Damp		E	
4.6	18		33.6' to 34.9' POORLY GRADED SAND (SP), Light Gray, Non-Plastic, Dry to Damp			
	20		34.9' to 41.5' POORLY GRADED SAND (SP) with gravel, Light Gray, Non-Plastic, Dry		F	
11.3	22					
	24					
	26					
	28					
12.6	30				G	
	32					
	34					
4.6	36				H	
	38					
	40					
	42					



International Inc.

Hole No. 8A2S-31

DRILLING LOG		DIVISION	INSTALLATION	Ft. Worth		SHEET
		SWD				1
						OF 1 SHEETS
1. PROJECT Indoor Aquatic Center - Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 54.7512" W 106° 21' 13.3152"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-31			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 17		UNDISTURBED 0	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry		16. DATE HOLE STARTED 1-25-10 COMPLETED 1-25-10	
7. THICKNESS OF OVERBURDEN			17. ELEVATION TOP OF HOLE 3937.95'			
8. DEPTH DRILLED INTO ROCK			18. TOTAL CORE RECOVERY FOR BORING %			
9. TOTAL DEPTH OF HOLE 40'			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			
MOISTURE	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
8.8	2		0.0' to 2.8' CLAYEY SAND (SC), Reddish Brown, Medium Plasticity, Damp		A	Caving after: 31' 1"
4.1	4		2.8' to 7.6' SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp		B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10' C. 10' - 15' D. 15' - 20' E. 20' - 25' F. 25' - 30' G. 30' - 35' H. 35' - 40'
10.9	6		7.6' to 10.1' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		C	
	8		10.1' to 12.2' CLAYEY SAND (SC), Brown, High Plasticity, Damp			
	10		12.2' to 22.3' POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry			
3.5	12		22.3' to 28.8' SANDY LEAN CLAY (CL) with caliche, Light Brown, Medium to High Plasticity, Damp		D	<u>Penetration Tests</u> Start Blow Depth Counts 0.0' 4-9-10 2.5' 7-12-13 5.0' 6-8-7 7.5' 6-8-8 10.0' 6-7-5 12.5' 4-5-6 15.0' 5-5-7 17.5' 3-8-10 20.0' 8-12-15 22.5' 37-50+@5" 25.0' 28-38-46 27.5' 38-38-34 30.0' 23-31-31 32.5' 15-19-19 35.0' 11-19-23 37.5' 10-17-25 40.0' 13-31-28
2.7	14		28.8' to 31.5' SANDY LEAN CLAY (CL), Brown, Medium Plasticity, Damp			
	16		31.5' to 33.7' POORLY GRADED SAND (SP), Light Gray, Non-Plastic, Dry		E	
	18		33.7' to 41.0' SANDY FAT CLAY (CH), Brown, High Plasticity, Damp to Moist			
11.5	20		41.0' to 41.5' POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry		F	
	22					
	24					
	26					
	28					
10.1	30				G	
	32					
	34					
10.8	36				H	
	38					
	40					
	42					



International Inc.

Hole No. 8A2S-32

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT Indoor Aquatic Center - Fort Bliss, TX PN: 057434			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION (Coordinates or Station) N 31° 50' 55.0620" W 106° 21' 13.6228"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSJ			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO. (As shown on drawing title and file number) 8A2S-32			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 17		UNDISTURBED 1	
5. NAME OF DRILLER Francisco Aguilar			14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry			
7. THICKNESS OF OVERBURDEN			16. DATE HOLE STARTED 1-26-10		COMPLETED 1-26-10	
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE 3937.83'			
9. TOTAL DEPTH OF HOLE 40'			18. TOTAL CORE RECOVERY FOR BORING %			
			19. SIGNATURE OF INSPECTOR Alex Ernesto Esquivel			

MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
11.6	2		0.0' to 2.7' CLAYEY SAND (SC), Reddish Brown, Medium Plasticity, Damp		A	Caving after: 32' 1"
5.7	4		2.7' to 7.2' SILTY SAND (SM), Reddish Brown, Non-Plastic, Damp		B	<u>Jar Samples</u> A. 0' - 5' B. 5' - 10' C. 10' - 15' D. 15' - 20' E. 20' - 25' F. 25' - 30' G. 30' - 35' H. 35' - 40'
17.2	6		7.2' to 11.0' FAT CLAY (CH), Brown, High Plasticity, Moist		C	<u>Shelby Tube (9' - 11.5')</u> Depth (11' - 11.5') Natural Density = 119.9 pcf Dry Density = 107.3 pcf
2.8	8		11.0' to 12.3' SANDY LEAN CLAY (CL), Brown, High Plasticity, Damp			<u>Penetration Tests</u> Start Blow Depth Counts 0.0' 4-7-8 2.5' 6-13-13 5.0' 5-7-5 7.5' 8-12-13 10.0' ST 12.5' 5-6-8 15.0' 3-6-8 17.5' 6-8-10 20.0' 6-13-21 22.5' 50+@2" 25.0' 24-32-27 27.5' 7-10-13 30.0' 8-23-23 32.5' 8-18-14 35.0' 10-14-24 37.5' 19-26-28 40.0' 12-22-33
2.7	10		12.3' to 22.8' POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry		D	
7.8	12		22.8' to 27.4' LEAN CLAY (CL) with caliche, Light Brown with White, High Plasticity, Damp to Moist		E	
13.4	14		27.4' to 30.1' SANDY LEAN CLAY (CL), Brown, Medium to High Plasticity, Dry to Damp		F	
6.9	16		30.1' to 31.7' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Damp		G	
	18		31.7' to 33.8' POORLY GRADED SAND (SP), Light Gray, Non-Plastic, Dry		H	
	20		33.8' to 37.4' SANDY FAT CLAY (CH), Brown, High Plasticity, Damp to Moist			
	22		37.4' to 40.1' POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry			
	24		40.1' to 41.5' POORLY GRADED SAND (SP), Light Gray, Non-Plastic, Dry			

APPENDIX B

LIST OF DRAWINGS

NOT USED

APPENDIX C

UTILITY CONNECTIONS

SEE APPENDIX J – DRAWINGS

APPENDIX D

RESULTS OF FIRE FLOW TESTS

Single Hydrant Flow Test 12/9/2009								
Hydrant	Make	Static	Dynamic	Actual Flow	Available Flow @20#	Location	Residual Pressure	Residual Correction
#1	Mueller 2009	78	33	962.93	1193.09	North side of Constitution and Circle in front of Physical Fitness Center	39	6

The following water flow data is provided for informational purposes only.

The data is accurate as of the date indicated.

The contractor is responsible for verifying the existing fire flow prior to design.

APPENDIX E

ENVIRONMENTAL INFORMATION

APPENDIX E
ENVIRONMENTAL DOCUMENTS
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- Potable Regulatory Policy (Policy Letter #16)
- Cross Connection Control Manual for Fort Bliss
- Fort Bliss Directorate of Public Works Environmental Division Requirements for Planning, Design and Construction

Potable Regulatory Policy (Policy Letter #16)

REPLY TO
ATTENTION OF:

DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY GARRISON COMMAND
BUILDING 1 PERSHING ROAD
FORT BLISS, TEXAS 79916-6812

IMSW-BLS-ZA

1 April 2006

POLICY LETTER #16

SUBJECT: Potable Water Regulatory Policy: Plumbing Customer Service Inspections (CSI) and Backflow Prevention Assembly Test Forms

1. **PURPOSE:** The Fort Bliss Water Services Company (FBWS) operates 9 water systems on Post: Fort Bliss Main Post, Biggs Army Air Field, Site Monitor, McGregor/Meyer Range Camp, Dona Ana Range Camp, Oro Grande Range Camp, Hueco Range Camp, SHORAD, and Redeye. FBWS is responsible for protecting the drinking water supply in accordance with State Regulations (Title 30 Texas Administrative Code 290.46(j), New Mexico Administrative Code 20.7.10.400(L)) from contamination or pollution which could result from improper water system plumbing construction or configuration.

2. Effective immediately, Customer Service Inspection certificates shall be completed prior to providing continuous water service to new construction or after significant plumbing renovations on any existing service or any existing service when the FBWS has reason to believe that cross-connections or other potential contaminant hazard exist or after any material improvement, correction, or addition to the water distribution facilities. As unacceptable plumbing practices are discovered, they shall be promptly eliminated to prevent possible contamination of the water supply. Also, any backflow prevention devices installed shall be installed in accordance with the Fort Bliss Cross-Connection Control Manual (FBCCCM), and tested in accordance with the FBCCCM.

3. **RESTRICTIONS:** The following unacceptable practices are prohibited:

a. No direct connection between the public drinking water supply and a potential source of contamination is permitted. Potential sources of contamination shall be isolated from the public water supply in accordance with the FBCCCM.

b. No cross-connection between the public water supply and a private water system is permitted. These potential threats to the public drinking water supply shall be eliminated at the service connection by the installation of an air-gap or a reduced pressure-zone backflow prevention device.

c. No connection which allows water to be returned to the public drinking water supply is permitted.

POLICY LETTER #16

SUBJECT: Potable Water Service Agreement: Plumbing Customer Service Inspections (CSI) and Backflow Test Forms

- d. No pipe or pipe fitting which contains more than 8.0% lead may be used for the installation or repair of plumbing at any connection which provides water for human use.
- e. No solder or flux which contains more than 0.2% lead can be used for the installation or repair of plumbing at any connection which provides water for human use.
- 3. This policy applies to work completed on all Fort Bliss facilities whether work is done by contract or in-house. Activities must insure that their contractors/ subcontractors follow this requirement.
- 4. Inspectors must possess proper credentials and be recognized as capable of conducting a customer service inspection certification by the State of Texas. Customer Service inspections may be performed by the following group members:
 - a. Plumbing Inspectors and Water Supply Protection Specialists licensed by the Texas State Board of Plumbing Examiners.
 - b. Customer Service Inspectors licensed by the Texas Commission of Environmental Compliance (TCEQ).
- 5. Recognized Backflow assembly testers must possess a current license from the TCEQ.
- 6. Submit completed customer service inspection and/or backflow test forms to the Directorate of Environment (DOE), IMSW-BLS-Z, Bldg 622, Attn: Water Program Manager, Fort Bliss, Texas 79916, or in person at bldg 622 room 111, or by fax at 568-1333. Copies of the FBCCCM are available from the DOE Water Program Manager, office phone number 568-6364. Forms will be maintained by the Directorate of Environment for a minimum of 10 years and be made readily available for review by the State regulatory entity.

- 2 Enclosures
- 1. CSI Certificate
- 2. Backflow Assembly Test Report

ROBERT T. BURNS
COL, AD
Commanding

FORT BLISS CUSTOMER SERVICE INSPECTION CERTIFICATE

Name of PWS: _____ PWS I.D.# _____

Bldg No. or Facility Description: _____

Contract # or Work Order #: _____

Contract issued by: _____ Prime Contractor: _____

Reason for Inspection:

New construction ☐Existing service where contaminant hazards are suspected ☐Major renovation or expansion of distribution facilities ☐

I _____, upon inspection of the private water distribution facilities connected to the aforementioned public water supply (PWS) do hereby certify that, to the best of my knowledge:

Compliance Non-compliance

☐ ☐

1. No direct connection between the public drinking water supply and a potential source of contamination exists. Potential sources of contamination are isolated from the public water system by an air gap or an appropriate backflow prevention assembly in accordance with Commission regulations.

☐ ☐

2. No cross-connection between the public drinking water supply and a private water system exists. Where an actual air gap is not maintained between the public water supply and a private water supply, an approved reduced pressure-zone backflow prevention assembly is properly installed and a service agreement exists for annual inspection and testing by a certified backflow prevention assembly tester.

☐ ☐

3. No connection exists which would allow the return of water used for condensing, cooling or industrial processes back to the public water supply.

☐ ☐

4. No pipe or pipe fitting which contains more than 8.0% lead exists in private water distribution facilities installed on or after July 1, 1988.

☐ ☐

5. No solder or flux which contains more than 0.2% lead exists in private water distribution facilities installed on or after July 1, 1988.

I further certify that the following materials were used in the installation of the private water distribution facilities:

Service lines Lead ☐ Copper ☐ PVC ☐ Other ☐Solder Lead ☐ Lead Free ☐ Solvent Weld ☐ Other ☐

Copy of inspector's certification card submitted to DOE. ☐ yes ☐ no (If no, please attach copy of inspector's certification card.)

I recognize that this document shall become a permanent record of the aforementioned Public Water System and that I am legally responsible for the validity of the information I have provided.

Remarks: _____

Signature of Inspector_____
Registration Number_____
Title_____
Type of Registration_____
Date

Fort Bliss

Backflow Prevention Assembly Test Report

ATZC-DOE, Building 622, Fort Bliss, TX 79916

Phone: (915) 568-1041

Fax: (915) 568-1333

General Information

Area / Range Camp	Building Name
-------------------	---------------

Building Number	Building Location
1	1000
2	2000
3	3000
4	4000
5	5000
6	6000
7	7000
8	8000
9	9000
10	10000

Point of Contact	Phone
------------------	-------

Current Assembly Information

Manufacturer	Model
Alcatel	3010
Alcatel	3010G
Alcatel	3010S
Alcatel	3010S2
Alcatel	3010S3
Alcatel	3010S4
Alcatel	3010S5
Alcatel	3010S6
Alcatel	3010S7
Alcatel	3010S8
Alcatel	3010S9
Alcatel	3010S10
Alcatel	3010S11
Alcatel	3010S12
Alcatel	3010S13
Alcatel	3010S14
Alcatel	3010S15
Alcatel	3010S16
Alcatel	3010S17
Alcatel	3010S18
Alcatel	3010S19
Alcatel	3010S20
Alcatel	3010S21
Alcatel	3010S22
Alcatel	3010S23
Alcatel	3010S24
Alcatel	3010S25
Alcatel	3010S26
Alcatel	3010S27
Alcatel	3010S28
Alcatel	3010S29
Alcatel	3010S30
Alcatel	3010S31
Alcatel	3010S32
Alcatel	3010S33
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Alcatel	3010S39
Alcatel	3010S40
Alcatel	3010S41
Alcatel	3010S42
Alcatel	3010S43
Alcatel	3010S44
Alcatel	3010S45
Alcatel	3010S46
Alcatel	3010S47
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Alcatel	3010S89
Alcatel	3010S90
Alcatel	3010S91
Alcatel	3010S92
Alcatel	3010S93
Alcatel	3010S94
Alcatel	3010S95
Alcatel	3010S96
Alcatel	3010S97
Alcatel	3010S98
Alcatel	3010S99
Alcatel	3010S100

Serial No.	Size	Tag
------------	------	-----

Type of service: ☐ Containment/Domestic
☐ Containment/Fire System
☐ Containment/Lawn Irr.
☐ Isolation

Specific physical location of assembly:

Equipment or system isolated:

Removed Assembly Information

Manufacturer

Model

Size

Serial No. _____

Gauge Information

ID

Manufacturer

Model

Serial No.

Last date of calibration

Test Results

Status ☐ Pass ☐ Fail

Additional Requirements

☐ Yes ☐ N/A

Thermal Expansion Control Present? ☐ No ☐ Unknown

(Containment domestic only)

Requirements made known? ☐ Yes ☐ No ☐ N/A

Adequate Freeze Protection Present? ☐ Yes ☐ No ☐ N/A

Requirements made known? ☐ Yes ☐ No ☐ N/A

Comments or Repairs made:

Test Type ☐ Initial ☐ Annual ☐ Repair ☐ Relocate

RP

CV1 AR _____

RV _____

CV2 Tight? ☐ Yes ☐ No

CV1 CR _____

CV2 _____

Buffer _____

DC CV1 _____ CV2 _____	
PVB _____ AIV _____ CV	SVB _____ _____

***The backflow prevention assembly detailed on this report has been tested and maintained as required and is certified to be operating within acceptable parameters.
I also certify that I tested this assembly and the test results are true.***

Technician ID	Name	Phone
---------------	------	-------

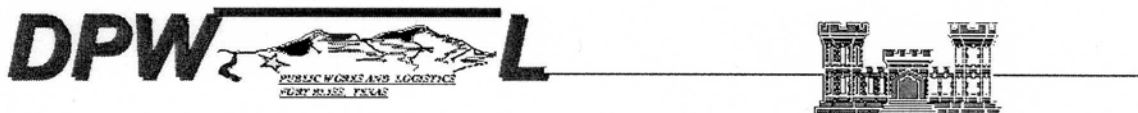
Signature _____ Time of Test _____ Date _____

Firm	Address	City	State	Zip
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Cross Connection Control Manual for Fort Bliss

United States Army Air
Defense Artillery Center
Fort Bliss, Texas

**Cross-Connection Control
Manual**



Cross-Connection Control Manual

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Cross-Connection Control Manual
ACRONYMS and ABBREVIATIONS

AG	Air Gap
ANSI	American National Standards Institute
ASSE	American Society of Sanitary Engineers
AVB	Atmospheric Vacuum Breaker
DC	Double Creek Valve Assembly
FCCCHR	Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California
NMED	New Mexico Environment Department
PVB	Pressure Vacuum Breaker
RP	Reduced Pressure Principle Assembly
SVB	Spill-Resistant Pressure Vacuum Breaker
TCEQ	Texas Commission on Environmental Quality
UPC	Uniform Plumbing Code

Cross-Connection Control Manual**INTRODUCTION**

Congress passed the 1974 Safe Drinking Water Act (SDWA), Public Law 93-523, to protect public drinking water supplies from harmful contaminants. Because Ft. Bliss is located in New Mexico and Texas, the Texas Commission on Environmental Quality (TCEQ) and the New Mexico Environment Department (NMED) are responsible for implementing the standards of the SDWA within their respective states. The primary function of Ft. Bliss as a water purveyor is to provide safe drinking water. As a result, they may incur liability for the quality of water provided. The TCEQ and the NMED prohibit connections to the public water supply where a contamination hazard exists, unless the public water supply is protected by approved backflow prevention methods, devices, or assemblies.

Ft. Bliss has established and will provide for a Cross-Connection Control Program pursuant to Title 30, Texas Administrative Code, Chapter 290, Public Drinking Water; the Texas Health and Safety Code, Chapter 341, Minimum Standards of Sanitation and Health Protection Measures; and the New Mexico Environment Department, Title 20 Environmental Protection, Chapter 7, Wastewater and Water Supply Facilities. This Program safeguards the Ft. Bliss water distribution system from contamination by containing hazards at the service connection and/or within premises served by the Ft. Bliss water distribution system and by the installation, testing, and maintenance of backflow prevention methods, devices, or assemblies.

This manual is intended to augment the Ft. Bliss Cross-Connection Control Program and to serve as the minimum standard for implementing the Program. The manual adheres to the standards in the latest editions of The Manual for Cross-Connection Control by the Foundation for Cross-Connection Control and Hydraulic Research (FCCCHR) at the University of Southern California and the Uniform Plumbing Code (UPC). Included in the manual are technical specifications and standards to define proper backflow prevention assembly applications, installation details and criteria, test procedures, care of test equipment, and test report forms. The manual assigns or clarifies responsibilities of the Cross-Connection Control Program Manager, the backflow prevention technician, and private sector contractors.

Because Ft. Bliss must comply with the regulations of New Mexico and Texas, the provisions of this manual are applicable to both states. Wherever a provision of a state occurs that does not apply to the other state, the provision shall be noted as such.

No manual can remain current indefinitely. All holders of this manual should anticipate additions, deletions, and amendments. The Ft. Bliss Cross-Connection Control Program Manager will make available subsequent changes.

Approved Backflow Prevention Assembly

An assembly that has been manufactured in full compliance with the American Water Works Association standards C510 and C511 and appears on the most current List of Approved Backflow Prevention Assemblies, published by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California.

Auxiliary Water System

Any water supply on or available to the premises other than the Ft. Bliss water distribution system. These auxiliary waters are not under the sanitary control of Ft. Bliss and may include water from another public water supplier, wells, used or reclaimed water, or industrial fluids.

Backflow

The unintended or undesirable reversal of the normal water flow caused by either backsiphonage or backpressure.

Backflow Prevention Methods, Devices, and Assemblies

The types of backflow prevention methods, devices, and assemblies shall be based on the existing or potential degree of hazard, and backflow condition. The definitions for each type of backflow prevention method, device, or assembly listed below are contained in subsequent sections of this manual. The types are as follows:

Air gap	Method
Atmospheric vacuum breaker	Device
Double check valve	Assembly
Pressure vacuum breaker	Assembly
Reduced pressure principle	Assembly
Spill-resistant pressure vacuum breaker	Assembly

The definitions for each type of backflow prevention method, device, or assembly listed above are contained in subsequent sections of this manual

Backflow Prevention Technician

A person deemed knowledgeable and competent in the installation, testing, maintenance, and repair of backflow prevention assemblies as determined by successful completion of a training course approved by the Cross-Connection Control Program Manager.

Cross-Connection Control Manual**DEFINITIONS****Backpressure**

A form of backflow due to an increase of system pressure that is greater than supply pressure.

Backsiphonage

A form of backflow due to negative or decreased pressure in the water supply system.

Containment Cross-Connection Control

Provides protection of the water distribution system from the backflow of contaminants. This is accomplished by the installation of an air gap or an approved backflow prevention assembly at the water service connection. Containment cross-connection control does not provide protection to the occupants of the premises, but shall be considered as additional backflow protection and shall not negate the use of backflow prevention on internal hazards within a premises potable water system.

Contamination

The presence of any foreign substance (organic, inorganic, radiological, or biological) in water that tends to degrade its quality to constitute a health hazard or impair the usefulness of the potable water system.

Continuous Pressure

A point in the potable water system that may be subjected to operating pressure for more than twelve hours in a twenty-four hour period.

Cross Connection

A point in the potable water system that is connected directly, or has the potential of being connected, to a source of non-potable substance through which contaminants may enter the potable water system under any condition.

Cross Connection — Controlled

A cross connection with an approved backflow prevention method, device, or assembly properly installed and maintained so that it will continuously afford protection commensurate with the degree of hazard.

Cross-Connection Control Program Manager

The person designated to administer the Cross-Connection Control Program and who is currently recognized as a backflow prevention assembly technician.

Ft. Bliss

A publicly owned water and sewer agency located in and serving the people of Ft. Bliss.

Cross-Connection Control Manual**DEFINITIONS****Health Hazard**

An actual or potential threat of contamination if introduced into the potable water system that may cause death, injury, illness or spread of disease.

Isolation Cross-Connection Control

Provides protection to the occupants of a premises by the installation of approved backflow prevention methods, devices, or assemblies at each cross connection within the premises' potable water system.

Non-Health Hazard

An actual or potential threat of pollution if introduced into the potable water system that would constitute a nuisance, inconvenience, or be aesthetically objectionable.

Pollution

The presence of any foreign substance in the potable water system that tends to degrade its quality but not constitute a health hazard or impair the usefulness of the water.

Premises Potable Water System

Those parts of the premises or other areas beyond the water service connections that are utilized in conveying potable water to points of use.

System Hazard

An actual or imminent threat of contamination to the water distribution system presenting a danger to public health.

Water Distribution System

The network of conduits used for the delivery of potable water from the source to the water service connection.

Water Service Connection

The point of connection to the water distribution system carrying potable water to the building, other points of use, or distribution on the property.

Cross-Connection Control Manual**RESPONSIBILITIES****Cross-Connection Control Program Manager**

The Directorate of the Environment is responsible for the sanitary control of the Ft. Bliss water distribution system and the premises potable water system.

A member of the Directorate of the Environment shall be designated as the Cross-Connection Control Program Manager. The manager is responsible for all administrative duties and for maintaining an aggressive cross-connection control program within the Ft. Bliss water distribution system and all premises potable water systems.

The manager's responsibilities include but are not limited to:

1. Administration and enforcement of all the provisions of the cross-connection control program.
2. The prevention of contaminants from entering a premises potable water system by the use of backflow prevention methods, devices, and assemblies installed at each cross connection within the premises potable water system.
3. The prevention of contaminants originating within a premises potable water system from entering the Ft. Bliss water distribution system by the use of backflow prevention methods and assemblies installed at each water service connection.
4. The prevention of contaminants from entering the City of El Paso's water distribution system from the Ft. Bliss water distribution system by the use of backflow prevention methods and assemblies installed at each water service connection to Ft. Bliss.
5. The completion of a detailed cross-connection control survey of the entire water distribution system and all premises potable water systems every five years.
6. Affirm that all testing performed at Ft. Bliss meets the requirements of this manual. This is accomplished by reviewing test reports. The Cross-Connection Control Program Manager also may select a percentage of tests to witness or confirm by testing after the technician.
7. Ensure that all certified backflow prevention technicians are properly certified in New Mexico and Texas.
8. Review plumbing plans and inspect plumbing systems as they are installed for compliance with the cross-connection control program.
9. Inspect installations of backflow prevention methods, devices, and assemblies for compliance with this manual installed by Ft. Bliss personnel or by private sector contractors.
10. Require unacceptable plumbing practices to be promptly eliminated to prevent actual or potential contamination of the potable water system.

Cross-Connection Control Manual**RESPONSIBILITIES**

11. Establish an annual schedule of inspecting and testing all backflow prevention methods, devices, and assemblies.
12. Keep accurate records of installations, tests, inspections, and repairs made to backflow prevention assemblies for a minimum period of three years.

Backflow Prevention Technician

The Backflow Prevention Technician is responsible for safeguarding the Ft. Bliss water distribution system and all premises potable water systems. The technician's responsibilities include but is not limited to:

1. Register with the Cross-Connection Control Program Manager prior to testing backflow prevention assemblies within the jurisdiction of the Cross-Connection Control Program Manager. Each technician shall be issued an identification number that must appear on all backflow prevention assembly test report forms.
2. Submit reports of assembly testing and repairs to the Cross-Connection Control Program Manager within one week from the time the test was conducted. Testing of backflow prevention assemblies shall not be considered complete unless a satisfactory test report has been received by the Cross-Connection Control Program Manager
3. Inform the Cross-Connection Control Program Manager if any existing backflow prevention assembly is not installed commensurate with the degree of hazard, pressure conditions, or if the assembly is not installed in its required orientation.
4. Shall not alter the design or operation of backflow prevention methods, devices, and assemblies.
5. Maintain training requirements in New Mexico and Texas. New Mexico follows the FCCCHR policy whereby training requirements are renewed every three years. The TCEQ tester recognition is indefinite and does not require renewal. In order for technicians to be able test assemblies throughout Ft. Bliss, their training shall be renewed every three years.

Ft. Bliss Personnel and Private Sector Contractors

1. Ft. Bliss personnel and private sector contractors shall fully comply with the Ft. Bliss Cross-Connection Control Program. They are responsible for installing backflow prevention methods, devices, and assemblies in their required orientation, and in accordance with the proper degree of hazard and pressure condition as indicated in this manual.
2. Ft. Bliss personnel and private sector contractors shall notify the Cross-Connection Control Program Manager that backflow prevention methods, devices, and assemblies have been properly installed and are ready for inspection and testing. They shall be responsible for all parts and labor needed to prepare the assembly for its acceptance test.

Cross-Connection Control Manual

RESPONSIBILITIES

3. Newly installed assemblies shall not be placed into service until an acceptance test has been performed indicating satisfactory results.

Cross-Connection Control Manual**INFORMATION MANAGEMENT**

The Cross-Connection Control Program Manager shall utilize an information management system consisting of two databases — Survey and Testing.

Survey Database

1. The Cross-Connection Control Program Manager shall complete a detailed cross-connection control survey of the entire water distribution system and all premises potable water systems every five years. This will be accomplished by surveying twenty percent of all premises every year.
2. The survey shall be performed by experienced cross-connection control inspectors and shall include inspection of all exposed and visibly accessible potable water piping, water consuming equipment, lawn irrigation systems, and fire protection systems.
3. Cross-connection control inspectors shall use a survey form similar to the one shown on page 10.
4. The survey findings shall be documented into a cross-connection control Survey Information Management Database. The survey database shall produce reports that will include the location and identification of water uses, adequacy of existing protection, and corrective actions. The report will include the size and type of backflow prevention methods, devices, or assemblies needed, and a prioritized list of findings.

The survey database also shall produce water conservation reports listing the location and identification of all applicable plumbing fixtures and flow rates.

5. All of the items in the survey that require corrective action are considered a health hazard and shall be corrected as soon as possible. The following prioritized list shall be followed in planning corrective actions:

Priority 1 —Contamination imminent

Where conditions or activities exist in which the introduction of a contaminant to the premises potable water system or the water distribution system is imminent.

Priority 2 — Contamination potential

Where conditions or activities exist in which there is a potential for the introduction of a contaminant to the premises potable water system or the water distribution system.

Priority 3 — No action required

Where cross connections are under control by the presence of an approved backflow prevention method, device, or assembly and there is no imminent or potential threat of contamination to the premises potable water system or the water distribution system.

Cross-Connection Control Manual**INFORMATION MANAGEMENT****Priority 4 — Installation correction**

Where cross connections are under control by the presence of an approved backflow prevention method, device, or assembly; however, the installation may not be installed in full compliance with the UPC or FCCCHR and shall require corrective action.

Priority 5 — Piping system note

Where a portion of the piping system does not present a threat of contamination to the premises potable water system or the water distribution system but may be a concern such as piping leaks or safety hazards.

6. The survey shall include inspection of plumbing fixtures for water conservation compliance. The maximum water consumption flow rates and quantities for plumbing fixtures shall be in accordance with TCEQ, rule 290.252 and UPC, section 402.0. The following table describes the fixtures and maximum flow rates:

Maximum Flow Rates and Consumption for Plumbing Fixtures	
Plumbing Fixture	Maximum Flow Rate or Quantity
Water closet	1.6 gallons per flush
Urinal	1.0 gallons per flush
Shower head	2.5 gallons per minute
Sink, lavatory faucet, faucet aerator	2.2 gallons per minute
Faucet serving transient public	0.25 gallons per use & self-closing valve
Drinking fountain	Operated by self-closing valve
Emergency shower/eye wash	None

Cross-Connection Control Manual

INFORMATION MANAGEMENT

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Cross-Connection Control Manual

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INFORMATION MANAGEMENT**Testing Database**

1. The Cross-Connection Control Program Manager is responsible for all backflow prevention assembly testing within the jurisdiction of the Directorate of the Environment.
2. All backflow prevention assemblies shall be tested for proper operation by backflow prevention technicians registered with the Cross-Connection Control Program Manager.
3. Backflow prevention technicians shall use the test report form shown on page 17. The form may be recreated from the testing database
4. All backflow prevention assembly test reports — pass or fail — shall be entered into the Testing Information Management Database. The testing database shall produce individual and summary reports. The reports shall include relevant information such as area, building, assembly, test findings, repairs, thermal expansion measures, adequacy of freeze protection, test equipment used, and technician identification.
5. The testing database shall incorporate automated defaults for ensuring proper testing information. Test reports shall default to "Fail" until proper test findings are entered. The database also shall track annual and past due tests.

Cross-Connection Control Manual**TESTING PROCEDURES****Preparation for Testing Backflow Prevention Assemblies**

Prior to testing backflow prevention assemblies the backflow prevention technician shall:

1. Notify affected onsite personnel that the water service will be shut off during backflow prevention assembly testing.
2. Notify the authority having jurisdiction over fire protection systems, and any alarm-monitoring agency, that the water supply to the fire protection system will be shut off during the test procedure.
3. Examine the area for safety hazards, water leaks, or relief valve discharging.
4. Determine that the backflow prevention assembly is installed commensurate with the degree of hazard, pressure conditions, and required orientation.
5. Check that the assembly is the correct size and has the essential components for testing such as resilient seated, full ported shutoff valves and test ports.
6. Note the manufacturer, model, serial number, size, application, and physical location.

Backflow Prevention Assembly Testing

1. The Cross-Connection Control Program Manager is responsible for all backflow prevention assembly testing within the jurisdiction of the Directorate of the Environment.
2. All backflow prevention assemblies shall be tested for proper operation by backflow prevention technicians registered with the Cross-Connection Control Program Manager.
3. Testing shall take place at the time of installation, repair, or relocation and at least on an annual schedule thereafter or more often when required by the Cross-Connection Control Program Manager.
4. A copy of the test report indicating satisfactory operation of the backflow prevention assembly, and any repairs, shall be forwarded to the Cross-Connection Control Program Manager within one week from the time the test was completed.
5. Assemblies that fail the operational test shall be repaired, overhauled, and retested immediately by a recognized backflow prevention technician. Testing of the assemblies shall not be considered complete until a test report certifying that the assembly is operating correctly has been received by the Cross-Connection Control Program Manager.
6. Upon the completion of a satisfactory test, the backflow prevention technician shall attach a laminated tag to the assembly with the following information on one side:

Cross-Connection Control Manual**TESTING PROCEDURES**

"Directorate of the Environment, ATZC-DOE, Building 622, Fort Bliss, TX 79916, Phone: (915) 568-6364, Fax: (915) 568-1333"

The reverse side of the tag shall indicate the assembly's manufacturer, model, serial number, size, and tag number. The applicable values of check valves No. 1 & 2, relief valve, air inlet valve, check valve, and the test date shall also be indicated.

7. Testing of backflow prevention assemblies shall be in accordance with Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California. The following steps shall be used when testing reduced pressure principal backflow prevention assemblies:

Reduced Pressure Principle

1. Determine the apparent static pressure drop across check valve No. 1 in the direction of flow.
2. Determine that the differential pressure relief valve operates to maintain the zone between the two check valves at least 2.0 psi less than supply pressure.
3. Determine that check valve No. 2 closes tight in reverse flow.
4. Determine that the confirmed static pressure drop across check valve No. 1 is at least 3.0 psi greater than the relief valve opening point.
5. Determine that the static pressure drop across check valve No. 2 is at least 1.0 psid.
6. Determine that the comparison of the two readings of check valve No. 1 (1 and 4) is within 1.0 psid.

Double Check Valve

1. Determine that the static pressure drop across check valve No. 1 is at least 1.0 psid.
2. Determine that the static pressure drop across check valve No. 2 is at least 1.0 psid.

Pressure Vacuum Breakers

1. Determine that the pressure in the body when the air inlet valve opens is at least 1.0 psi.
2. Determine that the static pressure drop across the check valve is at least 1.0 psid.

Cross-Connection Control Manual**TESTING PROCEDURES****Spill-Resistant Pressure Vacuum Breakers**

1. Determine that the pressure in the body when the air inlet valve opens is at least 1.0 psi.
2. Determine that the differential pressure of the check valve in the direction of flow shall be at least 1.0 psid.

Note: For the SVB to operate correctly, the check valve must have a greater value than the air inlet valve.

Test Equipment Calibration

1. Backflow prevention assembly test equipment shall be calibrated annually in accordance with ANSI and ASSE 1064 standards by a qualified calibration facility.
2. The test equipment manufacturer, model, serial number, and last date of calibration shall be recorded on the backflow prevention assembly test report form.

Maintenance and Repair

To maintain backflow prevention assemblies in proper operating condition, the technician shall adhere to the following:

1. Test assemblies in accordance with this manual.
2. Use currently calibrated testing equipment.
3. Consult manufacturer's repair/maintenance manuals.
4. Observe general safety procedures.
5. Use only manufacturer's replacement parts.
6. Be prepared to repair assembly at time of testing by maintaining an inventory of replacement parts.
7. Avoid flipping rubber check valve discs. Flipping shall be considered a temporary measure only to enable continuation of water service until a new replacement disc is installed.
8. Retest assembly for proper operation immediately following repair.
9. Slowly repressurize assembly when returning assembly to normal operating condition.

Cross-Connection Control Manual**TEST REPORT FORM**

Fort Bliss 0710020 Backflow Prevention Assembly Test Report ATZC-DOE, Building 622, Fort Bliss, TX 79916 Phone: (915) 568-1041 Fax: (915) 568-1333			
General Information Area / Range Camp _____ Building Name _____ Building Number _____ Building Location _____ Point of Contact _____ Phone _____			
Current Assembly Information Manufacturer _____ Model _____ Serial No. _____ Size _____ Tag _____ Type of service: <input type="checkbox"/> Containment/Domestic <input type="checkbox"/> Containment/Fire System <input type="checkbox"/> Containment/Lawn Irr. <input type="checkbox"/> Isolation Specific physical location of assembly: _____ Equipment or system isolated: _____		Removed Assembly Information Manufacturer _____ Model _____ Size _____ Serial No. _____ <hr/> Gauge Information ID _____ Manufacturer _____ Model _____ Serial No. _____ Last date of calibration _____	
Test Results Status <input type="checkbox"/> Pass <input type="checkbox"/> Fail		Additional Requirements <input type="checkbox"/> Yes <input type="checkbox"/> N/A Thermal Expansion Control Present? <input type="checkbox"/> No <input type="checkbox"/> Unknown (Containment domestic only) Requirements made known? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
RP CV1 AR _____ RV _____ CV2 Tight? <input type="checkbox"/> Yes <input type="checkbox"/> No CV1 CR _____ CV2 _____ Buffer _____	DC CV1 _____ CV2 _____	Adequate Freeze Protection Present? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Requirements made known? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
PVB AIV _____ CV _____		SVB _____ _____	
Test Type <input type="checkbox"/> Initial <input type="checkbox"/> Annual <input type="checkbox"/> Repair <input type="checkbox"/> Relocate		Comments or Repairs made: _____ _____	
<p style="text-align: center;">The backflow prevention assembly detailed on this report has been tested and maintained as required and is certified to be operating within acceptable parameters.</p> <p style="text-align: center;">I also certify that I tested this assembly and the test results are true.</p> Technician ID _____ Name _____ Phone _____ Signature _____ Time of Test _____ Date _____ Firm _____ Address _____ City _____ State _____ Zip _____			

**This form may be recreated from the
Testing Database**

Cross-Connection Control Manual**BACKFLOW PREVENTION METHODS, DEVICES, AND ASSEMBLIES**

Backflow Prevention Method, Device, and Assembly Application Table						
	Sewage	Hazards		Pressures		
		Health	Non-health	Back-Pressure	Back-Siphonage	Continuous Pressure
AG	Yes	Yes	Yes	Yes	Yes	Yes
AVB	No	Yes	Yes	No	Yes	No
DC	No	No	Yes	Yes	Yes	Yes
PVB	No	Yes	Yes	No	Yes	Yes
RP	No	Yes	Yes	Yes	Yes	Yes
SVB	No	Yes	Yes	No	Yes	Yes

AG	Air gap
AVB	Atmospheric vacuum breaker
DC	Double check valve assembly
PVB	Pressure vacuum breaker assembly
RP	Reduced pressure principle assembly
SVB	Spill-Resistant pressure vacuum breaker assembly

Backflow prevention methods, devices, and assemblies shall be installed and maintained in accordance with the proper degree of hazard, pressure condition, and orientation.

The AVB, PVB, SVB, and RP shall be used where health hazard matters are concerned. The DC shall only be used in non-health applications where convenience such as not draining the premises potable water system is the concern.

Cross-Connection Control Manual
CONTAINMENT CONTROL REQUIREMENTS

Containment Cross-Connection Control

1. No water service connection shall be permitted to any premises handling substances deleterious or hazardous to the public health without an air gap separation or an approved backflow prevention assembly installed at the water service connection.
2. Table "Minimum Containment Requirements" shows typical installations that require backflow prevention assemblies at the water service connections of the premises. This table may be supplemented by the Cross-Connection Control Program Manager upon the discovery of a potential hazard to the public water supply.

The table does not indicate use of the double check valve assembly (DC) in containment applications. The use of a DC must be restricted to non-health use only. The Cross-Connection Control Program Manager may allow the use of existing DCs on potable water supplies serving fire protection systems if the hydraulic design of the system cannot accommodate the pressure loss of a RP. Once performance of the water distribution system is upgraded existing fire protection systems shall be fitted with RPs.

3. All approved backflow prevention methods, devices, and assemblies shall be installed in their required orientation, in accordance with the proper degree of hazard and pressure condition as indicated in this manual.
4. Premises considered to pose a threat of contamination to the water distribution system shall be subject to a water use inspection. The Directorate of the Environment or its representatives shall have the right of entry to any land or buildings at reasonable times to make water use examinations or inspections. If cross connections are discovered during the premises water use survey that could result in the backflow of contaminants into the public water supply, Ft. Bliss shall immediately implement appropriate corrective actions.
5. At any premises where contamination hazards exist and there is adequate isolation cross-connection control in effect, the Cross-Connection Control Program Manager may determine that an air gap separation or an approved backflow prevention assembly may not be required at the water service connection.

Cross-Connection Control Manual

CONTAINMENT CONTROL REQUIREMENTS

This table is not an all-inclusive list and may be supplemented by the Cross-Connection Control Manager.

Backflow prevention methods, devices, and assemblies shall be installed and maintained in accordance with the proper degree of hazard, pressure condition, and orientation.

Typical premises or water uses that require containment control:	Method or assembly
Agricultural	AG or RP
Aircraft, missile plant	AG or RP
Animal grooming, processing, feedlot	AG or RP
Automotive repair, plant	AG or RP
Auxiliary water supply	AG or RP
Beverage processing	AG or RP
Cannery, packing house, rendering plant	AG or RP
Car washing	AG or RP
Chemical manufacturing	AG or RP
Clinic	AG or RP
Cold storage facility	AG or RP
Commercial laundry	AG or RP
Complex piping system	AG or RP
Construction water service point	AG or RP
Cooling system	AG or RP
Dairy, product processing	AG or RP
Dental office, laboratory	AG or RP
Docks, dockside facility	AG or RP
Dye plant	AG or RP
Fire protection system	AG or RP
Food processing plant	AG or RP
Garment finisher	AG or RP
Green house	AG or RP
Heating system	AG or RP
Hospital, mortuary, funeral home	AG or RP
Industrial system	AG or RP
Laundry	AG or RP

Cross-Connection Control Manual

Typical premises or water uses that require containment control:	Method or assembly
Lawn irrigation system	AG or RP
Lease space (shopping center, warehouse)	AG or RP
Manufacturing natural or synthetic rubber	AG or RP
Medical, surgical	AG or RP
Metal finishing, molding, forming, plating	AG or RP
Microchip fabrication	AG or RP
More than one connection to the public water supply	AG or RP
Nursing, convalescent home	AG or RP
Paper processing	AG or RP
Petroleum processing, storage	AG or RP
Photographic processing	AG or RP
Plastic injection	AG or RP
Power plant	AG or RP
Radiator shop	AG or RP
Radioactive material	AG or RP
Ready mix concrete	AG or RP
Reclaimed potable water system	AG or RP
Sand, gravel plant	AG or RP
School, laboratory	AG or RP
Sewage lift station, treatment plant	AG or RP
Slaughter house	AG or RP
Steam generating	AG or RP
Tall buildings	AG or RP
Taxidermy	AG or RP
Temporary service	AG or RP
Toxic substance	AG or RP
Uncontrolled cross connections	AG or RP
Veterinary	AG or RP
Water Storage vehicle	AG or RP
Water treatment	AG or RP
Well	AG or RP
Where inspection is restricted	AG or RP

Cross-Connection Control Manual
ISOLATION CONTROL REQUIREMENTS

Isolation Cross-Connection Control

1. No installation of any water operated equipment that may cause contamination of the premises potable water system shall be permitted unless it is equipped with an approved backflow prevention method, device, or assembly.
2. Requirements for backflow prevention methods, devices, and assemblies installed within the premises potable water system are for the safety and protection of the occupants of the premises.
3. In addition to performing cross-connection control surveys, the Cross-Connection Control Program Manager shall conduct inspections in response to water quality complaints to determine compliance with the provisions of the Cross-Connection Control Program. In the event cross connections require isolation control, the Cross-Connection Control Program Manager shall have approved backflow prevention methods, devices, and assemblies installed at specific locations within the premises potable water system.
4. Mandatory isolation cross-connection control requirements are shown in the table, "Minimum Isolation Cross-Connection Control Requirements" on page 21. This table is not an all-inclusive list of hazards that may be found and may be supplemented by the Cross-Connection Control Manager.
5. All approved backflow prevention methods, devices, and assemblies shall be installed in their required orientation, in accordance with the proper degree of hazard, and pressure condition as indicated in this manual.

Cross-Connection Control Manual

ISOLATION CONTROL REQUIREMENTS

This table is not an all-inclusive list and may be supplemented by the Cross-Connection Control Manager.

Backflow prevention methods, devices, and assemblies shall be installed and maintained in accordance with the proper degree of hazard, pressure condition, and orientation.

Typical water uses that require isolation control:	Method, device, or type of assembly					
	AG	RP	DC	PVB	SVB	AVB
Air conditioning system	Yes	Yes	No	Yes	Yes	Yes
Air washer	Yes	Yes	No	Yes	Yes	Yes
Aspirator	Yes	Yes	No	Yes	Yes	Yes
Autoclave	Yes	Yes	No	No	No	No
Auxiliary water supply	Yes	Yes	No	No	No	No
Bedpan washer	Yes	Yes	No	Yes	Yes	Yes
Boiler	Yes	Yes	No	No	No	No
Carbonation equipment	Yes	Yes	No	No	No	No
Chemical dispenser	Yes	Yes	No	Yes	Yes	Yes
Chilled potable water system	Yes	Yes	No	No	No	No
Chiller	Yes	Yes	No	No	No	No
Compressors (water cooled)	Yes	Yes	No	No	No	No
Cooling tower	Yes	Yes	No	No	No	No
Cuspidor	Yes	Yes	No	Yes	Yes	Yes
Decorative pond	Yes	Yes	No	Yes	Yes	Yes
Degreasing equipment	Yes	Yes	No	No	No	No
Drinking fountain	Yes	Yes	No	No	No	No
Evaporative cooler	Yes	Yes	No	Yes	Yes	Yes
Faucet with pull-out spout	Yes	Yes	No	Yes	Yes	Yes
Fire protection system	Yes	Yes	No	No	No	No
Fountains	Yes	Yes	No	Yes	Yes	Yes
Garbage disposal	Yes	Yes	No	Yes	Yes	Yes
Domestic heat exchanger	Yes	No	No	No	No	No
Heating system	Yes	Yes	No	No	No	No
Hose bibb	Yes	Yes	No	Yes	Yes	Yes
Hydrant (wall, yard)	Yes	Yes	No	Yes	Yes	Yes

Cross-Connection Control Manual
ISOLATION CONTROL REQUIREMENTS

Typical water uses that require isolation control:	Method, device, or type of assembly					
	AG	RP	DC	PVB	SVB	AVB
Industrial fluid	Yes	Yes	No	Yes	Yes	Yes
Kitchen equipment	Yes	Yes	No	Yes	Yes	Yes
Laboratory equipment	Yes	Yes	No	Yes	Yes	Yes
Lawn irrigation system	Yes	Yes	No	Yes	Yes	Yes
Medical equipment	Yes	Yes	No	Yes	Yes	Yes
Non-potable potable water system	Yes	Yes	No	No	No	No
Non-pressure vessel	Yes	Yes	No	Yes	Yes	Yes
Photo processing equipment	Yes	Yes	No	Yes	Yes	Yes
Pressure vessel	Yes	Yes	No	No	No	No
Receptors such as tanks, vats, sumps	Yes	Yes	No	Yes	Yes	Yes
Reclaimed water	Yes	Yes	No	No	No	No
Sewer, pump, ejector	Yes	Yes	No	No	No	No
Shampoo basin	Yes	Yes	No	Yes	Yes	Yes
Shower with hose	Yes	Yes	No	Yes	Yes	Yes
Sink (hand, janitor, dish, etc.)	Yes	Yes	No	No	No	No
Solar water heating equipment	Yes	Yes	No	No	No	No
Sterilizer	Yes	Yes	No	No	No	No
Swimming pool	Yes	Yes	No	Yes	Yes	Yes
Trap primer	Yes	Yes	No	No	No	No
Tub	Yes	Yes	No	Yes	Yes	Yes
Urinal	Yes	Yes	No	Yes	Yes	Yes
Water closet	Yes	Yes	No	Yes	Yes	Yes
Water closet flushometer tank	Yes	Yes	No	Yes	Yes	Yes
Water cooled equipment	Yes	Yes	No	Yes	Yes	Yes
Watering trough	Yes	Yes	No	Yes	Yes	Yes

Cross-Connection Control Manual**GENERAL REQUIREMENTS****Auxiliary Water Systems and/or Wells**

Premises having auxiliary water systems and/or wells that are connected to the water distribution system shall have the following options:

1. Permanently abandon use of the auxiliary water system and/or well by "plugging the well" in accordance with the Directorate of the Environment, or
2. Completely and permanently, sever the auxiliary water system and/or well from the potable water system in accordance with the Directorate of the Environment and install an air gap or a reduced pressure principle backflow prevention assembly at the water service connection.

Backflow Prevention Assembly Enclosures

1. Backflow prevention assemblies may be installed indoors provided provisions for drainage and accessibility for testing and maintenance are met.
2. Backflow prevention assemblies installed outdoors shall meet the following requirements:
 - a. Color (color shall be appealing to Fort Bliss's overall color scheme).
 - b. Durability (ability to withstand weather extremes, wind, sand, temperature change and remain exceptionally tough).
 - c. Vandal Protection: (ability to withstand hits, kicks, etc... without denting or cracking, intruder resistant and tagging resistant)
 - d. UV Protection (prevent discolorations of fabrics or breakdown of materials)
 - e. Vector Resistant (does not provide a habit for poisons vectors such as black widow, brown recluse, scorpions, rattle snakes, etc.).
 - f. Design (adequate drainage, protect from freezing, easily accessible for testing, maintenance, and repair).
3. Enclosures must be installed and maintained so that backflow prevention assemblies are safely accessible for testing, maintenance, and repair.

Carbonators

1. Water supplies to carbonators shall be provided with a reduced pressure backflow prevention assembly.
2. There shall be no copper piping between the assembly and carbonator equipment.

Chemical Dispensers

1. Water supplies to chemical dispensers shall be provided with an air gap, reduced pressure backflow prevention assembly, or a spill resistant pressure vacuum breaker assembly.

Cross-Connection Control Manual**GENERAL REQUIREMENTS**

2. Chemical dispensers shall be supplied directly from the premises potable water system.
3. Chemical dispensers shall not be supplied from other fixtures such as janitor sink faucets.

Construction Water Service

1. The Cross-Connection Control Program Manager shall designate a hydrant or stand pipe to assist contractors during construction.
2. A water meter and a reduced pressure backflow prevention assembly shall be maintained at all times of operation at the hydrant or stand pipe.

Fire Protection Systems

1. Fire protection systems are systems of pipes and equipment used exclusively to supply water for extinguishing fire. Potable water supplies serving new and existing fire protection systems, including but not limited to standpipes and automatic sprinkler systems, shall be protected with an air gap or a reduced pressure principle assembly.
2. Whenever a backflow prevention assembly is installed in the potable water supply to a new fire protection system, the hydraulic design of the system shall account for the pressure drop through the assembly.
3. Whenever a backflow prevention assembly is retrofitted in the potable water supply to an existing fire protection system, the hydraulic design of the system shall be checked to verify that there is sufficient water pressure available for satisfactory operation of the system.
4. The hydraulic design calculations for new and existing fire protection systems shall be submitted to the Cross-Connection Control Program Manager for approval prior to the installation.

Heat Exchangers

1. Heat exchangers used for domestic water heat transfer shall be double walled.
2. Single wall heat exchanges shall be prohibited and removed from operation as per UPC.

Labeling

1. To prevent sanitary fixtures from being connected to non-potable waters, and for safety and sanitation, the UPC requires that each plumbing fixture be provided with potable water.
2. In all buildings where potable water and non-potable water systems are installed, each system shall be clearly identified. Labels designating the liquid

Cross-Connection Control Manual**GENERAL REQUIREMENTS**

or gas being conveyed and the direction of flow will be colored coded as follows:

Potable water — green background with white lettering.

Nonpotable water — yellow background with black lettering.

3. The labeling shall occur every twenty feet and at least once per room, and shall be visible from floor level.
4. Each outlet and hose bibb in the nonpotable system shall be posted: "CAUTION: NONPOTABLE WATER, DO NOT DRINK"

Lawn Irrigation Systems

1. A person may not sell, design, consult, install, maintain, alter, repair, or service an irrigation in Texas unless the person is a licensed irrigator by the TCEQ. A person who is licensed as an installer may only connect an irrigation system to a water supply while being under the direct supervision of a licensed irrigator.
2. The premises potable water system shall be protected from lawn irrigation systems with an approved atmospheric vacuum breaker, pressure vacuum breaker, spill-resistant pressure vacuum breaker, or reduced pressure assembly installed commensurate with the device's/assembly's pressure condition and required orientation.
3. The water distribution system shall be protected from lawn irrigation systems with an approved pressure vacuum breaker, spill-resistant pressure vacuum breaker, or reduced pressure assembly installed commensurate with the assembly's pressure condition and required orientation.

Make up Water to Boilers and Chillers

1. Make up water connections to steam and hot water boilers shall be provided with a reduced pressure backflow prevention assembly.
2. The assembly shall be located in the inlet piping to the boiler's pressure reducing valve.

New Water Service Connections

The Cross-Connection Control Manager shall review all requests for new water service connections to determine if containment cross-connection control is needed. If it is determined that a containment backflow prevention assembly is required, the assembly must be installed, inspected and tested for proper operation before water service is established.

Cross-Connection Control Manual**GENERAL REQUIREMENTS****Parallel Installations**

1. Parallel installations of two or more backflow prevention assemblies of the same type is an effective means of insuring that uninterrupted water service is maintained during testing or repair, and is strongly recommended when such continuity is desired. Parallel installations shall be in accordance with the "Parallel Installation Table" on page 26.
2. The design and plan of implementation for parallel installations shall be submitted to the Cross-Connection Control Program Manager for approval prior to the installation.
3. Sites with service lines 10" or less shall utilize at least one line-sized assembly.
4. Where two line-sized assemblies are installed in parallel, one of the assemblies shall remain closed.
5. Sites with service lines 12" or larger shall utilize assemblies sized in accordance with the "Parallel Installation — Rated Flow Table" on page 12. The combined flow capacity of the parallel assemblies shall equal or exceed the flow capacity of the service line. For example: The combined flow capacity of two 8" assemblies (2 x 1600 gpm = 3200 gpm) would be sufficient on a 12" water service line (3000 gpm).
6. During testing and repair of parallel assemblies, the flow demand shall be reduced to match the flow rate of the remaining "on line" assembly. When a parallel assembly is left closed during normal operation, it shall be tested for proper operation before the main assembly is tested.
7. Where three parallel assemblies are sized in accordance with the "Parallel Installation — Rated Flow Table", one of the assemblies shall remain closed.

Parallel Installation Table		
Application	Service lines 10" and less	Service lines 12" and larger
Site can tolerate interruption of water service.	1 line sized BFP	2 rated flow sized BFPs in parallel
Site cannot tolerate interruption of water service, but can operate with reduced flow.	1 line sized BFP and one smaller in parallel to match reduced flow demand	2 rated flow sized BFPs in parallel
Site cannot tolerate interruption of water service or reduced flow.	2 line sized BFPs in parallel	3 rated flow sized BFPs in parallel

Cross-Connection Control Manual**GENERAL REQUIREMENTS**

Parallel Installation - Rated Flow	
Size of assembly or service line	Rated flow (gpm)
2-1/2	225
3	320
4	500
6	1000
8	1600
10	2300
12	3000
14	3700
16	4400

Tenant and Lease Facilities

1. Tenant and lease facilities such as fast food restaurants, service stations, snack bars, and sites used or managed by other than Ft. Bliss personnel, are considered to be premises having potable water systems that are impractical to ascertain whether or not proper isolation cross-connection control exists. Tenant / Lease facilities will require containment cross-connection control.
2. The Cross-Connection Control Manager shall maintain jurisdiction of containment backflow prevention assemblies on tenant and lease facilities and shall be included in the annual testing schedule.

Thermal Expansion

1. The installation of "non-return devices" such as backflow prevention assemblies, check valves, dual check valves, pressure reducing or pressure regulating valves, and water softeners between the water service connection and the domestic water heater may create a "closed domestic potable water system" preventing pressure relief through the building supply.
2. A UPC listed thermal expansion tank shall be installed between the "non return device" and the water storage tank heated by indirect means and heat input limited to 200,000 Btu/hr, water temperature limited to 210° F, and water capacity that does not exceed 120 gallons.
3. A thermal expansion tank shall be provided in accordance with ASME Code, Section VIII, Division 1, on boilers operating at pressures not exceeding 160 psig and water temperatures not exceeding 210° F when either of the following limitations is exceeded: heat input of 200,000 Btu/hr; or nominal

Cross-Connection Control Manual**GENERAL REQUIREMENTS**

water-containing capacity of 120 gallons (Texas Department of Licensing and Regulation, 16 Texas Administrative Code, Chapter 65). The thermal expansion tank shall be located on the cold water supply, the tank's air pressure matched to the system water pressure, and sized to total water heater capacity and supply pressure.

4. The backflow prevention technician shall indicate on the backflow prevention assembly test report form if the requirements for thermal expansion control are met.

Water Closets and Urinals

1. Water closet and urinal flushometer valves shall be equipped with an UPC listed atmospheric vacuum breaker.
2. The critical level of the vacuum breaker shall be at least six inches above the flood level rim of a water closet or the highest part of the urinal.
3. Water closet and urinal tanks shall be equipped with a UPC listed ball cock.

Water Treatment Units

Waste or discharge from reverse osmosis or other types of water treatment units shall enter the drainage system through an air gap.

Cross-Connection Control Manual
GENERAL REQUIREMENTS

Cross-Connection Control Manual**AIR GAP****Defined**

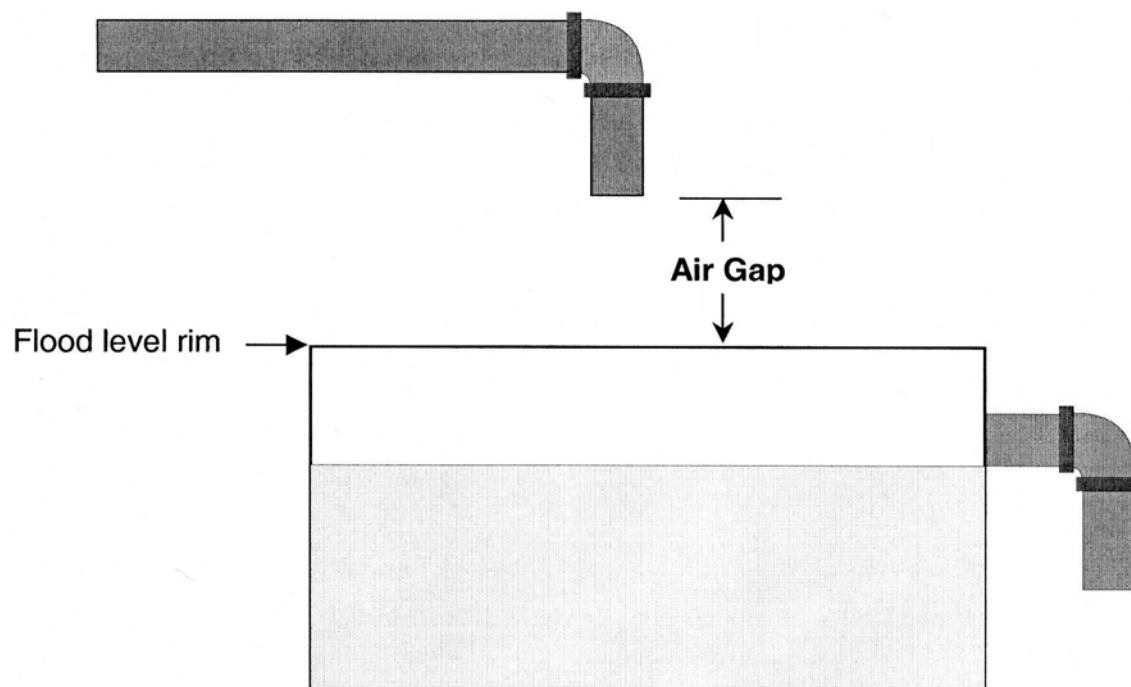
An air-gap is the unobstructed vertical distance through the free atmosphere between the discharge end of a potable water supply pipe and the flood level rim of an open or non-pressure vessel

Installation Requirements

1. The air gap must be at least twice the diameter of the water supply outlet above the flood level rim of a non-vessel or one inch, whichever is greater.
2. The air gap shall be installed with adequate access and clearance for inspection and located outside any enclosure or hooded area containing fumes that are toxic, poisonous, or corrosive.
3. A permanent platform is necessary whenever the air gap is installed more than five feet above floor or grade. The platform must be within five feet of the lowest part of the assembly and must meet all applicable safety standards and codes.

Inspection Requirements

Air gaps shall be inspected at the time of installation. In conjunction with testing backflow prevention assemblies at a particular site, or other activities, the technician shall inspect all air gaps to verify that the required vertical distance is maintained and that there is no hose connected to it. The air gap may be inspected more often when required by the Cross-Connection Control Program Manager.



Cross-Connection Control Manual
ATMOSPHERIC VACUUM BREAKER**Defined**

An atmospheric vacuum breaker consists of a float check, check seat, and an air inlet port. The AVB shall protect against health hazards under backsiphonage conditions only.

Installation Requirements

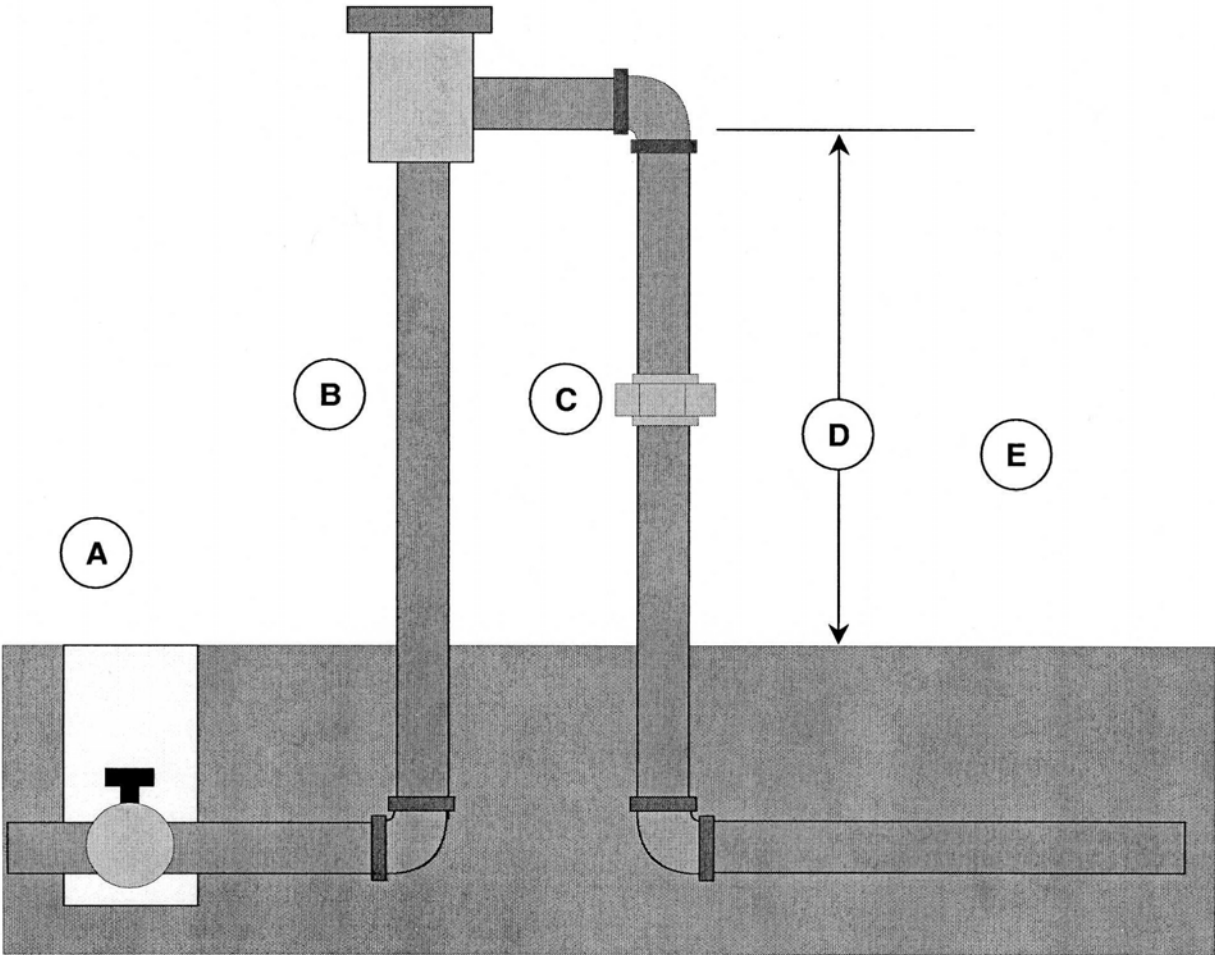
1. The AVB shall be used in isolation applications only. It shall not be used in containment applications.
2. The AVB shall be installed between 6" and 60" above grade, floor, or platform and at a minimum of 6" above the highest point of the device's outlet piping. The installation shall include unions.
3. There shall be no valves in the outlet piping of the AVB.
4. There shall be adequate drainage provisions to accommodate water discharge from flushing and operation.
5. Whenever the AVB is insulated, the insulation must be easy to remove in order to facilitate inspection and repair.
6. AVBs must be installed horizontal and plumb.
7. Immediately after installation and before service is restored, the device must be thoroughly flushed. This is accomplished by completely removing the float check and opening the inlet shut-off valve to flush debris that may foul the device.
8. The size of the AVB shall not be less than the size of the water supply piping.
9. The AVB shall be installed in accordance with the device's operating pressure and temperature rating.
10. The AVB shall be installed with adequate access and clearance for testing, maintenance, and repairs and outside any enclosure or hooded area containing fumes that are toxic, poisonous, or corrosive.
11. A permanent platform is necessary whenever the device is installed more than five feet above floor or grade. The platform must be within five feet of the lowest part of the device and must meet all applicable safety standards and codes.
12. The AVB shall be installed in accordance with the manufacturer's flow rate specifications. The flow rates and pressure loss due to increasing or decreasing flow rates will vary from one manufacturer to another.

Inspection Requirements

The AVB shall be inspected at the time of installation and on an annual schedule thereafter or more often when required by the Cross-Connection Control Program Manager.

Cross-Connection Control Manual

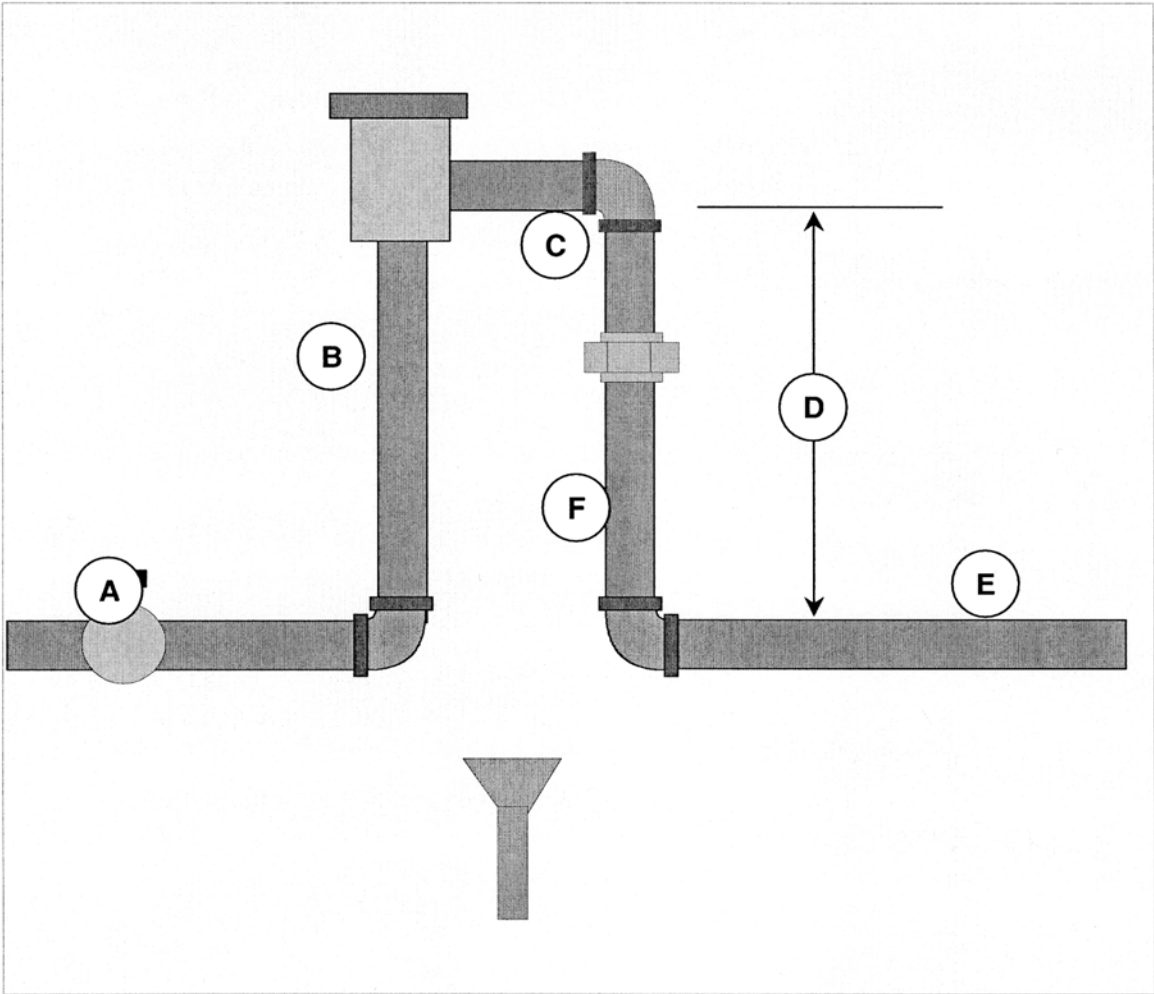
ATMOSPHERIC VACUUM BREAKER



Outdoor Isolation Installation	
A	Shut off valve
B	Service line — cement lined ductile iron, copper, or galvanized piping
C	Union — above grade
D	Minimum 6" above grade and all outlet piping. Installations more than 60" above grade or floor require a permanent platform.
E	No valves allowed in outlet piping

Cross-Connection Control Manual

ATMOSPHERIC VACUUM BREAKER



Outdoor Isolation Installation	
A	Shut off valve
B	Service line — cement lined ductile iron, copper, or galvanized piping
C	Union
D	Minimum 6" above grade and all outlet piping. Installations more than 60" above grade or floor require a permanent platform.
E	No valves allowed in outlet piping
F	Provide adequate drainage

Cross-Connection Control Manual
DOUBLE CHECK VALVE ASSEMBLY

Double Check Valve Assembly Defined

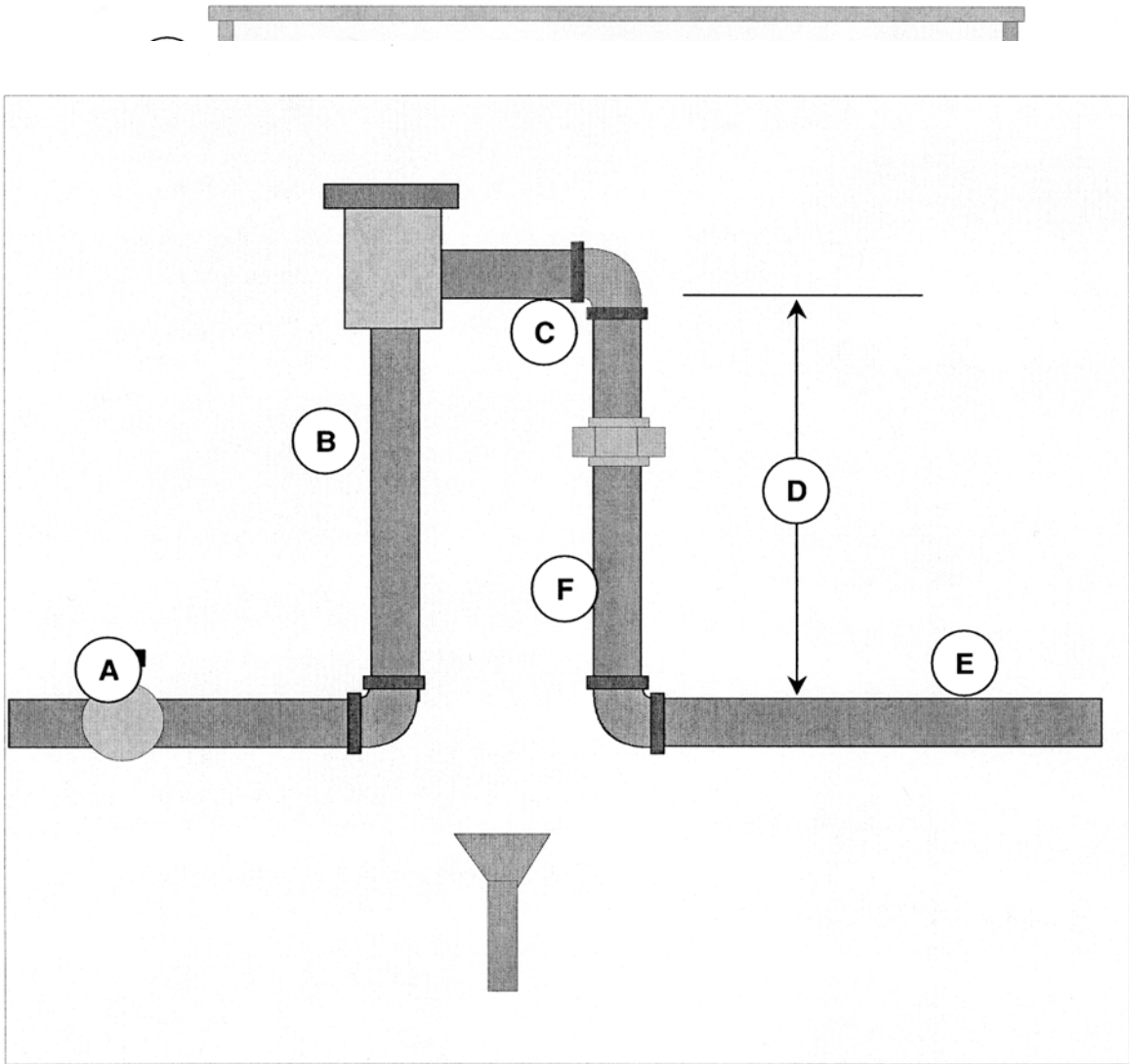
A double check valve backflow prevention assembly consists of two independently acting internally loaded check valves, four properly located resilient seated test ports, and two resilient seated isolation valves at each end of the assembly.

Installation Requirements

1. The DC must be installed between 12" and 36" above grade from the lowest part of the assembly for outdoor installations, and between 12" and 60" above floor or grade from the lowest part of the assembly for indoor installations.
2. The DC shall not be subjected to flooding. There shall be adequate drainage provisions to accommodate water discharge from flushing and testing.
3. Whenever the DC is insulated, the insulation must be easy to remove in order to facilitate testing and repair.
4. DCs must be installed horizontal and plumb unless specifically noted in the "List of Approved Backflow Prevention Assemblies" published by FCCCHR.
5. Thermal expansion and/or water hammer in the outlet piping of the assembly can cause excessive pressure (backpressure). A water hammer arrestor, thermal expansion tank, resilient seated check valve, or surge suppresser installed in the outlet piping is recommended to avoid damage to the piping system and the assembly.
6. Assemblies 2-1/2" and larger must be adequately supported.
7. Immediately after installation and before the assembly is tested or service is restored, the assembly must be thoroughly flushed. This is accomplished by completely removing the No. 1 check valve and opening the No. 1 shut-off valve to flush debris that may foul the assembly.
8. The size of the DC shall not be less than the size of the water supply piping.
9. The DC shall be installed in accordance with the assembly's operating pressure and temperature rating
10. The DC shall be installed with adequate access and clearance for testing, maintenance, and repairs and outside any enclosure or hooded area containing fumes that are toxic, poisonous, or corrosive.
11. A permanent platform is necessary whenever the assembly is installed more than five feet above floor or grade. The platform must be within five feet of the lowest part of the assembly and must meet all applicable safety standards and codes.
12. The DC shall be installed in accordance with the manufacturer's flow rate specifications. The flow rates and pressure loss due to increasing or decreasing flow rates will vary from one manufacturer to another.

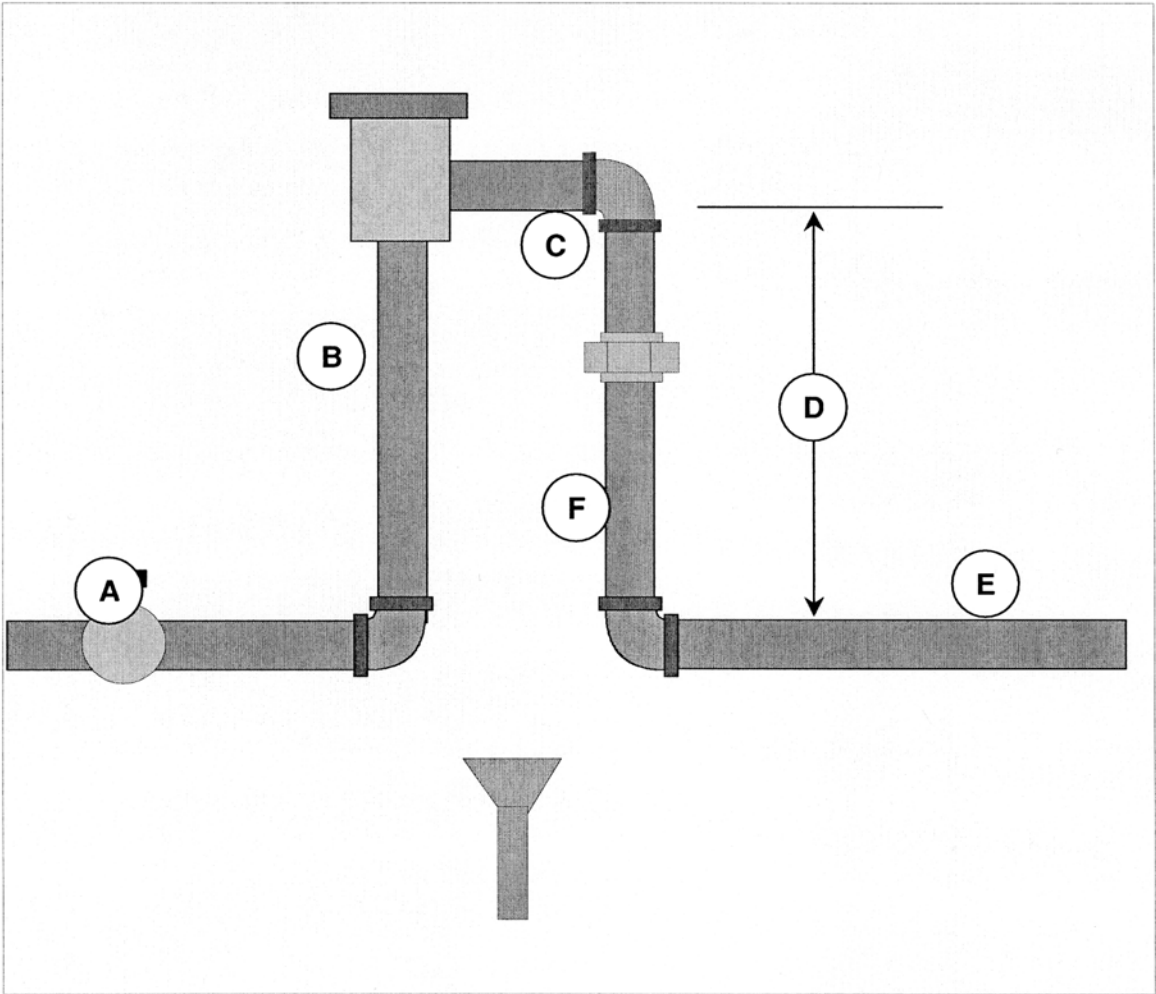
Cross-Connection Control Manual

DOUBLE CHECK VALVE ASSEMBLY



Outdoor Installation	
A	Shutoff valve and valve box
B	Thrust blocking
C	Service line — cement line ductile iron, copper, or galvanized piping
D	Sleeve with insulation (typical)
E	4" concrete slab (3000 psi, reinforced w/1/2 rebar & 4" mesh, scored)
F	12" minimum / 36" maximum from lowest part of assembly
G	Metal supports on assemblies 2½" and greater (typical)
H	Unions or flanges — above grade (typical)

Cross-Connection Control Manual



Indoor Installations	
A	Service line — cement lined ductile iron, copper, or galvanized piping
B	Sleeve with insulation (typical)
C	12" minimum / 36" maximum from lowest part of assembly
D	Metal supports
E	Unions or flanges
F	Provide adequate drainage

Cross-Connection Control Manual**PRESSURE VACUUM BREAKER****Defined**

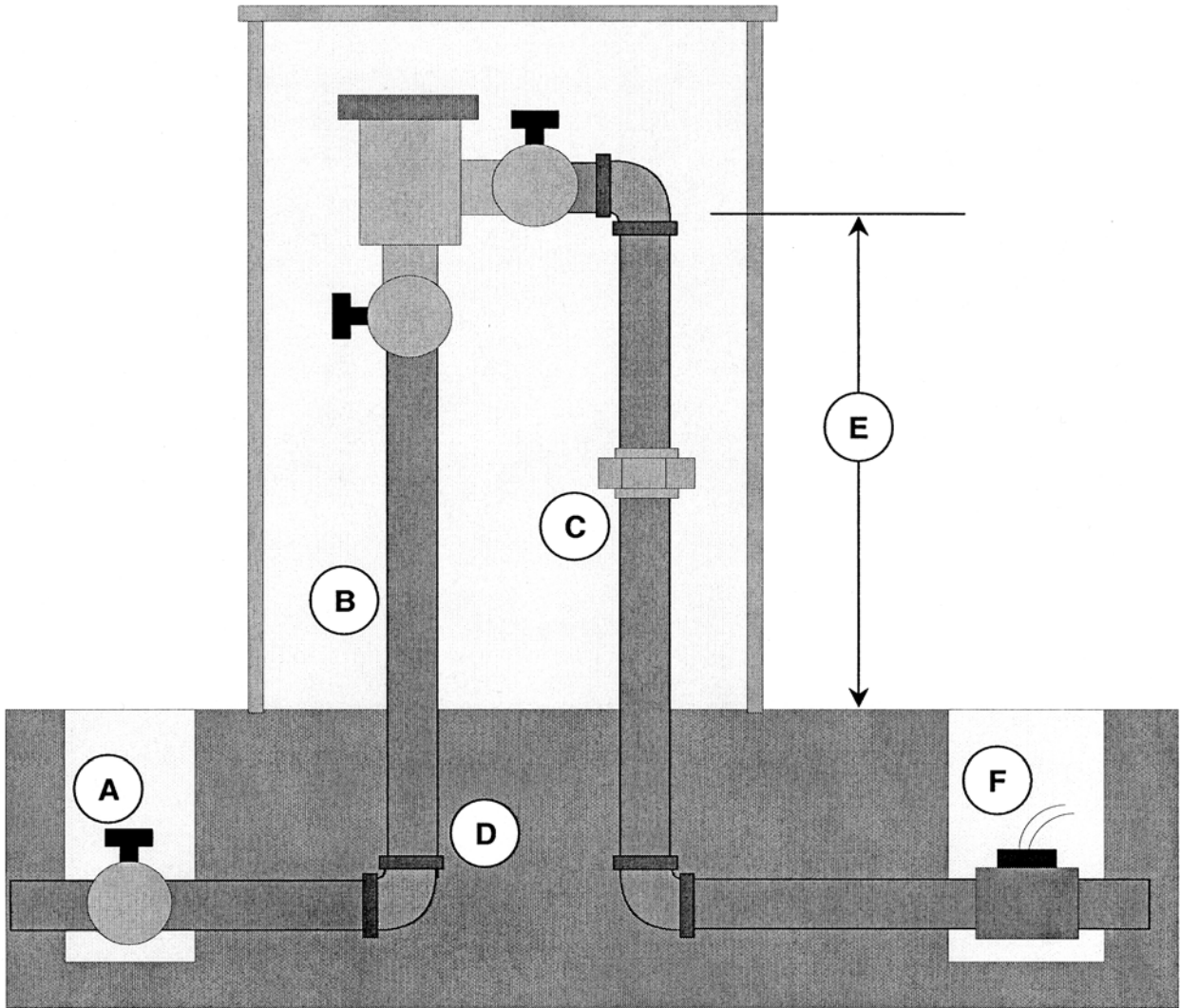
A pressure vacuum breaker assembly consists of an independently operating internally loaded check valve and an independently operating loaded air inlet valve on the discharge side of the check valve. The assembly shall be equipped with two properly located resilient seated test ports and two resilient seated isolation valves at each end of the assembly.

Installation Requirements

1. The PVB shall be installed between 12" and 60" above grade, floor, or platform and at a minimum of 12" above the highest point of the assembly's outlet piping. The assembly installation shall include unions.
2. There shall be adequate drainage provisions to accommodate water discharge from flushing and testing.
3. Whenever the PVB is insulated, the insulation must be easy to remove in order to facilitate testing and repair.
4. PVBs must be installed horizontal and plumb.
5. Immediately after installation and before the assembly is tested or service is restored, the assembly must be thoroughly flushed. This is accomplished by completely removing the air inlet valve and the check valve and opening the No. 1 shut-off valve to flush debris that may foul the assembly.
6. The size of the PVB shall not be less than the size of the water supply piping.
7. The PVB shall be installed in accordance with the assembly's operating pressure and temperature rating.
8. The PVB shall be installed with adequate access and clearance for testing, maintenance, and repairs and outside any enclosure or hooded area containing fumes that are toxic, poisonous, or corrosive.
9. A permanent platform is necessary whenever the assembly is installed more than five feet above floor or grade. The platform must be within five feet of the lowest part of the assembly and must meet all applicable safety standards and codes.
10. The PVB shall be installed in accordance with the manufacturer's flow rate specifications. The flow rates and pressure loss due to increasing or decreasing flow rates will vary from one manufacturer to another.
11. In containment applications, the PVB shall only be used for dedicated lawn irrigation systems such as parks, medians, and golf courses.

Cross-Connection Control Manual

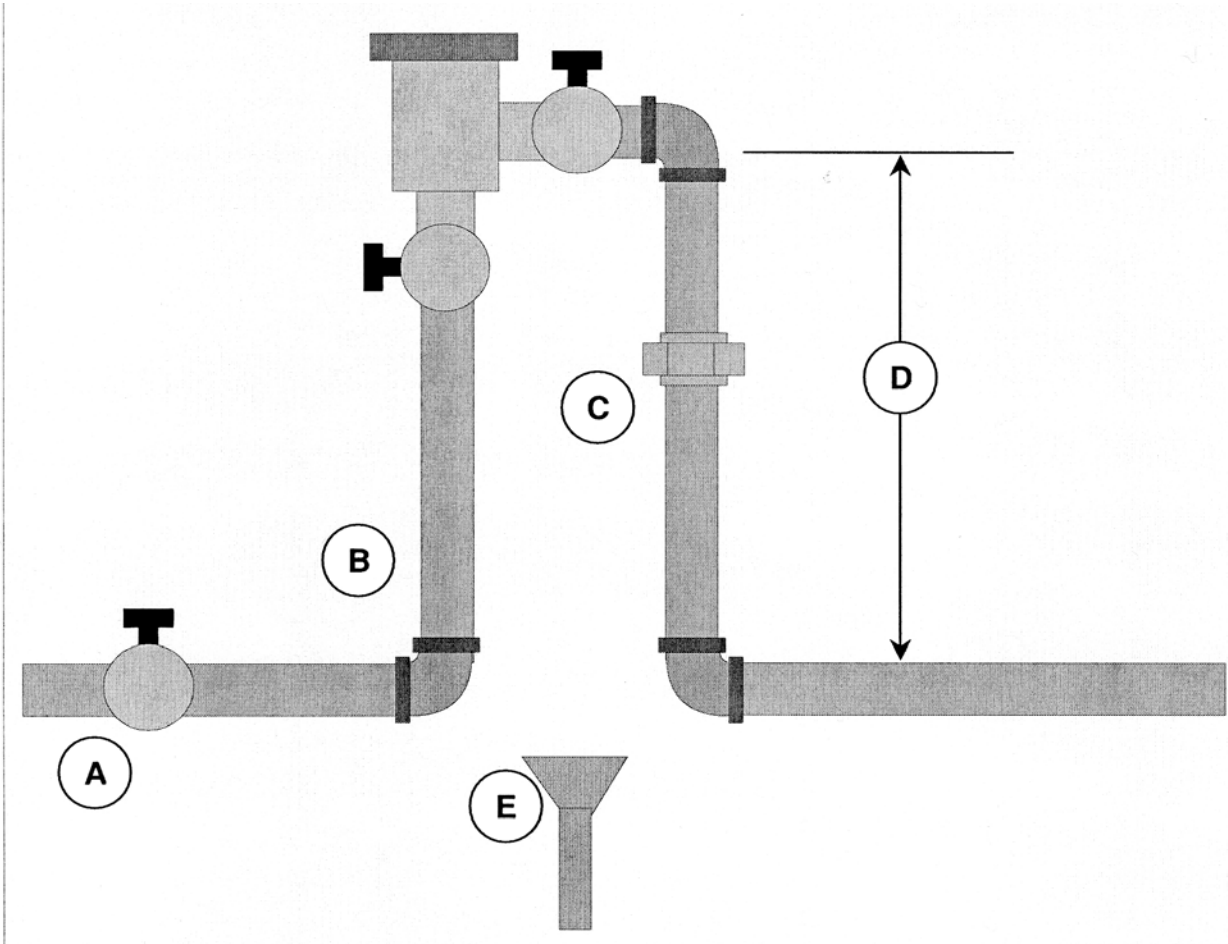
PRESSURE VACUUM BREAKER



Outdoor Installations	
A	Shut off valve
B	Service line — cement lined ductile iron, copper, or galvanized piping
C	Union — above grade
D	Protective enclosure
E	Minimum 12" above grade and all outlet piping. Installations more than 60" above grade or floor require a permanent platform
F	Master or zone valve — if applicable

Cross-Connection Control Manual

PRESSURE VACUUM BREAKER



Indoor Installation	
A	Shut off valve
B	Service line — cement lined ductile iron, copper, or galvanized piping
C	Union
D	Minimum 12" above all outlet piping. Installations more than 60" above grade or floor require a permanent platform
E	Provide adequate drainage

Cross-Connection Control Manual**REDUCED PRESSURE PRINCIPLE ASSEMBLY**

Defined

A reduced pressure principle backflow prevention assembly consists of two independently acting internally loaded check valves and a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves and below the first check valve. The assembly shall be equipped with two properly located resilient seated test ports, and two resilient seated isolation valves at each end of the assembly.

Installation Requirements

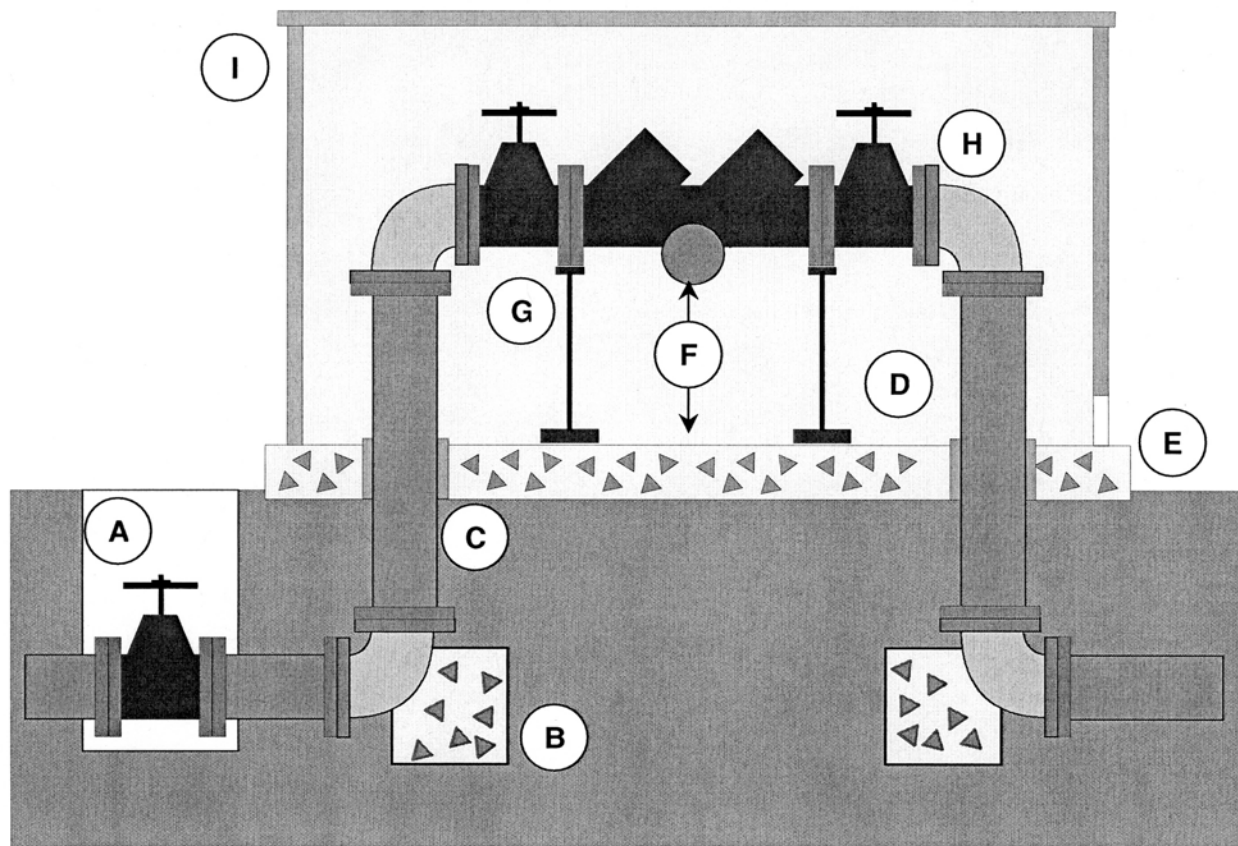
1. The RP must be installed between 12" and 36" above grade from the lowest part of the assembly for containment installations, and between 12" and 60" above floor or grade from the lowest part of the assembly for isolation installations. The assembly shall not be subjected to flooding.
2. Drainage requirements for the RP must be hydraulically calculated to handle the maximum relief valve discharge rate; see "Relief Valve Discharge Rates" chart on page 43. Most manufacturers' air-gap drains are designed to only handle occasional "spitting" from the relief valve and will not accommodate a full discharge. An approved air-gap separation at the relief valve is required.
3. RPs must be installed in locations where intermittent and continuous discharge from the relief valve will not be objectionable.
4. Whenever the RP is insulated, precautions must be taken to prevent blockage of the relief valve opening and access to components. The insulation must be easy to remove in order to facilitate testing and repair.
5. RPs must be installed horizontal and plumb unless specifically noted in the "List of Approved Backflow Prevention Assemblies" published by the FCCCHR.
6. Thermal expansion and/or water hammer in the outlet piping of the assembly can cause excessive pressure. A water hammer arrestor, thermal expansion tank, spring-loaded resilient seated check valve, or surge suppresser installed in the outlet piping is recommended to avoid damage to the piping system and the assembly.
7. Fluctuating inlet pressure may cause intermittent discharge of the relief valve and eventual fouling of the assembly. In a static condition, the zone between the two check valves must be maintained at least 2.0 psi below the supply pressure. A resilient seated check valve installed in the inlet piping of the RP is recommended to maintain constant pressure of the zone during water supply pressure fluctuations.
8. Assemblies 2-1/2" and larger must be adequately supported.
9. Immediately after installation and before the assembly is tested or service is restored, the assembly must be thoroughly flushed. This is accomplished by

Cross-Connection Control Manual**REDUCED PRESSURE PRINCIPLE ASSEMBLY**

completely removing the No. 1 check valve and opening the No. 1 shut-off valve to flush debris that may foul the assembly.

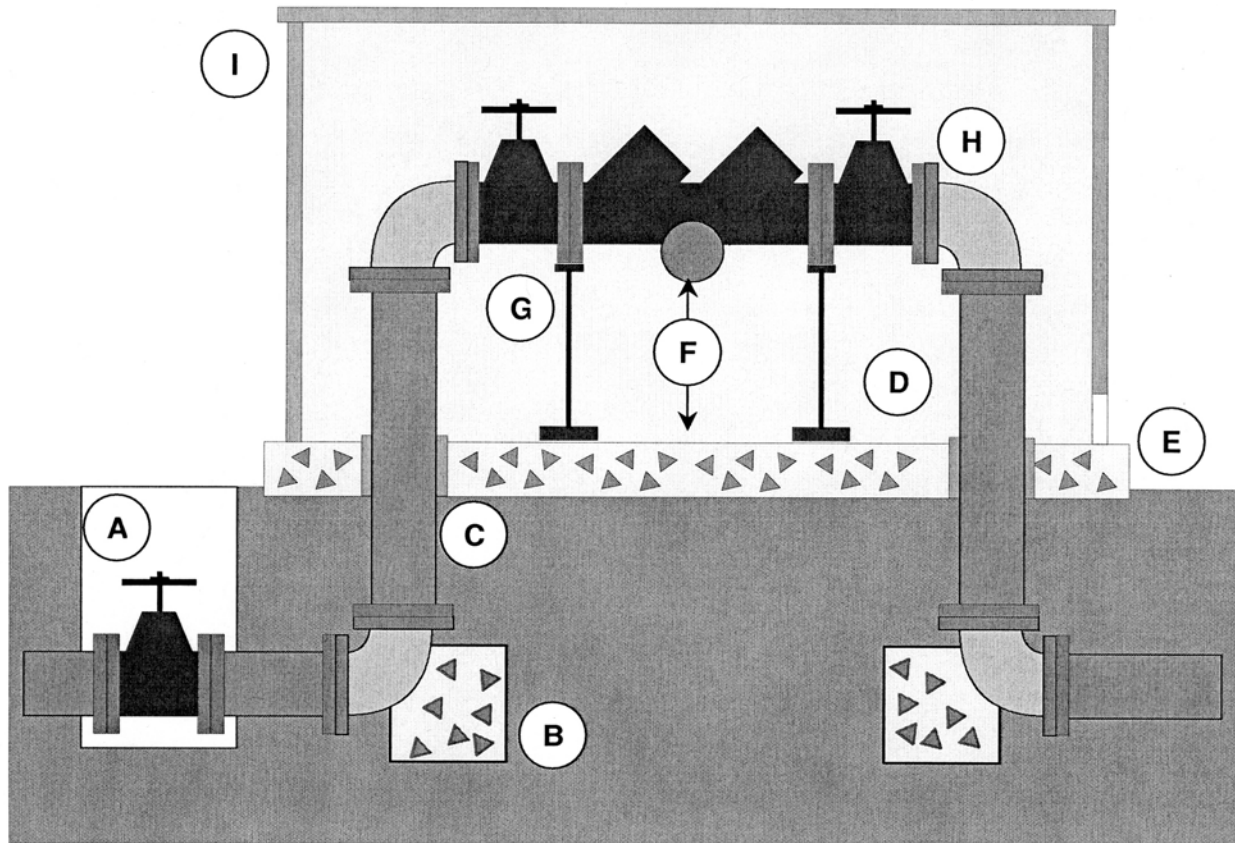
10. The size of the RP shall not be less than the size of the water supply piping.
11. The RP shall be installed in accordance with the assembly's operating pressure and temperature rating.
12. The RP shall be installed with adequate access and clearance for testing, maintenance, and repairs and outside any enclosure or hooded area containing fumes that are toxic, poisonous, or corrosive.
13. A permanent platform is necessary whenever the assembly is installed more than five feet above floor or grade. The platform must be within five feet of the lowest part of the assembly and must meet all applicable safety standards and codes.
14. The RP shall be installed in accordance with the manufacturer's flow rate specifications. The flow rates and pressure loss due to increasing or decreasing flow rates will vary from one manufacturer to another.

Cross-Connection Control Manual **REDUCED PRESSURE PRINCIPLE ASSEMBLY**



Indoor Installations	
A	Service line — cement lined ductile iron, copper, or galvanized piping
B	Sleeve with insulation (typical)
C	12" minimum / 60" maximum from lowest part of assembly
D	Metal supports
E	Unions or flanges
F	Provide adequate drainage (see "Relief Valve Discharge Rates" page 43)

Cross-Connection Control Manual **REDUCED PRESSURE PRINCIPLE ASSEMBLY**

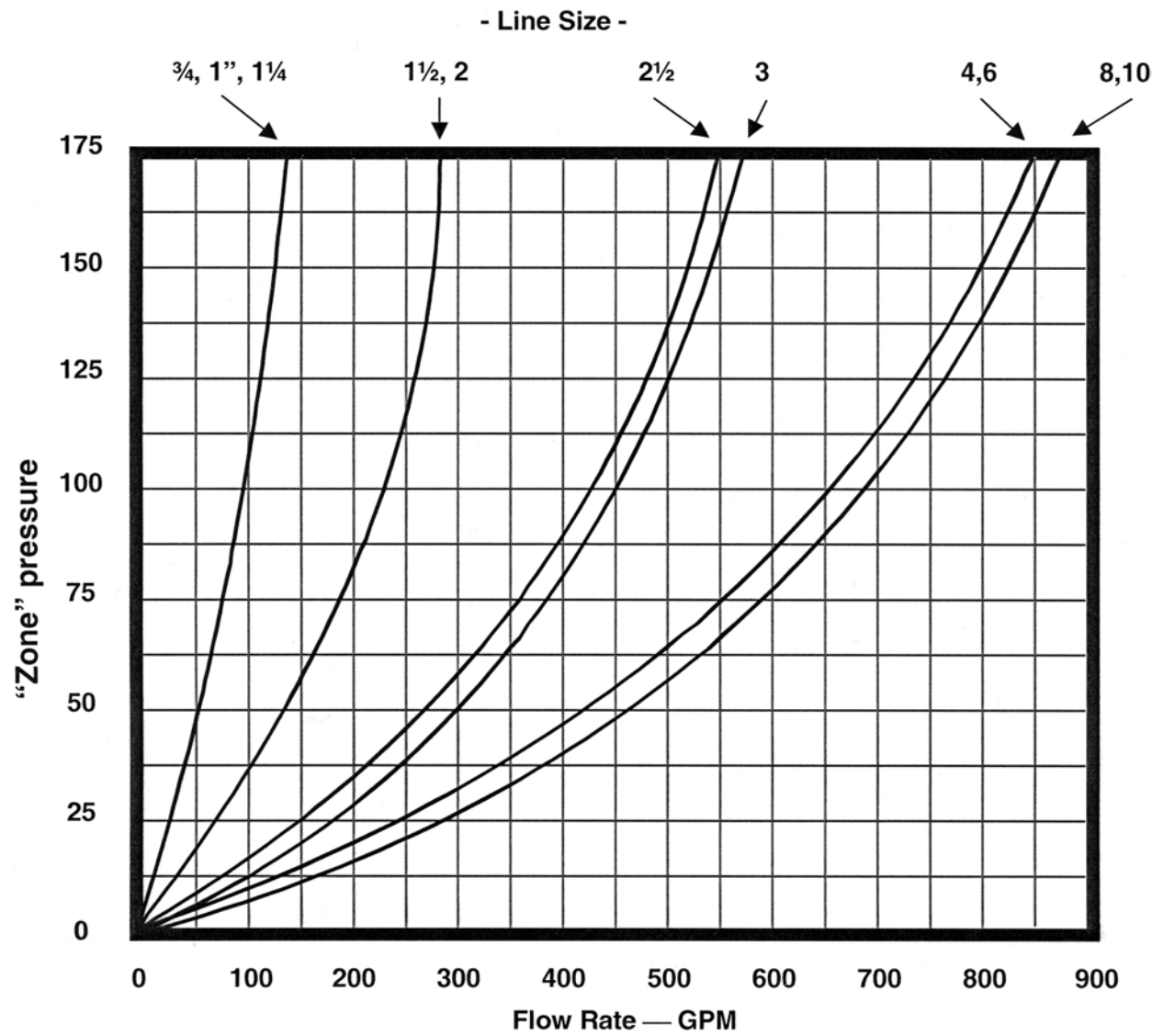


Outdoor Installations	
A	Shutoff valve and valve box
B	Thrust blocking
C	Service line — cement lined ductile iron, copper, or galvanized piping
D	Sleeve with insulation (typical)
E	4" concrete slab (3000 psi, reinforced w/1/2" rebar & 4" mesh, scored)
F	12" minimum / 36" maximum from lowest part of assembly
G	Metal supports on assemblies 2½" and greater (typical)
H	Unions or flanges — above grade (typical)
I	Protective enclosure with drain (see "Relief Valve Discharge Rates" page 43)

Cross-Connection Control Manual

REDUCED PRESSURE PRINCIPLE ASSEMBLY

Relief Valve Discharge Rates



Flow Rate	Drain Size	Flow Rate	Drain Size
55	2	350	5
112	3	450	6
170	4	760	8

Cross-Connection Control Manual**SPILL-RESISTANT PRESSURE VACUUM ASSEMBLY****Defined**

A spill-resistant pressure vacuum breaker assembly consists of an independently operating internally loaded check valve and an independently operating loaded air inlet valve on the discharge side of the check valve. The assembly shall be equipped with one properly located resilient seated test port and vent valve and two resilient seated isolation valves at each end of the assembly.

Installation Requirements

1. The SVB is intended for indoor installations.
2. The installation requirements for the SVB are the same as the requirements for the PVB.

Cross-Connection Control Manual**EDUCATION & TRAINING****Education and Training**

The Cross-Connection Control Program Manager will establish and maintain cross-connection control education and training for Ft Bliss personnel. Continuous education and training of personnel is essential to insure that people involved in every part of the program have current information. Examples of continuous education and training are as follows:

1. Contractor orientation on acceptable new construction practices. This is applicable to all crafts prior to beginning work.
2. Awareness workshops for Ft. Bliss personnel such as engineers, inspectors, designers, janitorial, and all crafts.
3. Manufacturer hands on training on the use of product used at Ft. Bliss.
4. Forty-hour certification courses repeated every three years.
5. Distribution of printed material for building occupants.

Cross-Connection Control Manual**SEVERABILITY / VIOLATIONS****Severability**

If any provision, section, subsection, sentence, clause, or phrase of this manual, or the application of same to a given set of circumstances, is for any reason held to be invalid, the validity of the remaining portions of the manual shall not be affected.

Violations

The following shall be grounds for the discontinuance of water service:

- Removal or bypassing of any backflow prevention method, device, or assembly;
- Falsification of test reports;
- Obtaining water from a fire hydrant in violation of cross-connection control requirements;
- Connecting a fire protection system to a premises potable water system;
- Allowing uncontrolled cross connections to exist; or
- Failure to cooperate in the installation, maintenance, testing or inspection of backflow prevention assemblies as required by this guidance. Water service shall not be restored until such conditions are corrected.

Discontinuance of water service may be immediate, and without written notice, whenever, in the judgment of the Cross-Connection Control Program Manager, such action is necessary to protect the safety of the premises or the purity of the water distribution system.

Cross-Connection Control Manual

APPROVAL

Approved this ____ day of _____, 2001

By _____

Cross-Connection Control Manual**REFERENCES and WORKS CITED**

- 16 Texas Administrative Code, Chapter 65. Administrative Rules of the Texas Department of Licensing and Regulation.
- City of Albuquerque, Cross Connection Prevention and Control Ordinance. Albuquerque. 1995.
- El Paso Water Utilities Public Service Board. Cross-Connection Control Program, Manual of Procedures. El Paso. 1996.
- Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California. Manual of Cross-Connection Control. 9th ed. Los Angeles, 1993.
- International Association of Plumbing and Mechanical Officials. Uniform Plumbing Code. 2000 ed. Walnut, 1999.
- Lower Valley Water District, Cross-Connection Control Program, Manual of Procedures. Socorro. 1999.
- New Mexico Environment Department, Title 20 Environmental Protection, Chapter 7. Wastewater and Water Supply Facilities.
- Texas Administrative Code. Chapter 290, Public Drinking Water.
- Texas Health and Safety Code, Chapter 341. Minimum Standards of Sanitation and Health Protection Measures.

Revision Number: 4
Revision Date: 30 March 2009

Fort Bliss Directorate of Public Works Environmental Division
Requirements for Planning, Design, and Construction



PURPOSE

This document provides guidance on environmental requirements, policies, and general concerns based upon previous experiences pertaining to the Fort Bliss Army Installation. The purpose of this document is to ensure that all information gaps regarding environmental issues associated with proposed construction projects are closed. The information contained herein serves as an environmental reference for project stakeholders throughout all phases of construction-related activities (conceptual, proposal phase, design, and construction). Topics addressed are derived from a combination of feedback provided for NEPA project document reviews, and information communicated to stakeholders at construction-related project meetings by Directorate of Public Works-Environmental Division (DPW-E) staff. This is a living document, and as such, all information is subject to change as policies are revised, legal requirements change, and new environmental impacts are identified.

Note: All construction activities need to be reviewed by DPW-E prior to any ground disturbance to ensure there are no environmental issues, including historic properties.

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AIR QUALITY

Refrigeration (Comfort Cooling/Dining Facilities/Cold Storage)

The use of non-ODC (ozone depleting compounds) shall be used in any refrigeration unit. Class II ODC will be phased out starting 2020 and use of non-ODC will meet phase out deadline and requirements under Clean Air Act, Title VI (40 CFR 82).

ARCHEOLOGY

Archeological sites, artifacts, and historic buildings on Fort Bliss are protected by Federal law and Army regulations. Surface collection, excavation, or willful destruction of archeological sites and artifacts (arrowheads, pottery, bottles, etc.) is subject to criminal penalties including fines and incarceration. Disturbing human graves or remains is strictly protected by law. Willful excavation or disturbance of human burials is subject to criminal penalties including fines and incarceration. In the event of inadvertent discovery of archeological sites, artifacts, or human remains, cease work and contact DPW-E Archeology staff.

ASBESTOS

Asbestos Management Requirements

IAW 40 CFR 61 NESHAP, an asbestos survey is required to determine if regulated asbestos containing material (RACM) in excess of the regulatory thresholds will be disturbed. In the event that RACM will be removed above the regulatory thresholds, a 10- day notice to the State will be required to be submitted. All demolitions will require the 10-day notification regardless of whether a building contains asbestos. Asbestos disposal requires a Hazardous Waste Manifest for tracking purposes. Hazardous Waste Manifests for asbestos will be signed by the Asbestos Contractor as the Generator's Representative. In addition, asbestos must be disposed of by the contractor at an off-post approved landfill that accepts asbestos-containing material at the contractor's expense. All other regulated and hazardous wastes must be properly handled, stored, and disposed of in accordance with local, state, and federal laws and regulations.

LEAD

Lead Management Requirements

Prior to building demolition, a Toxicity Characteristic Leaching Procedure (TCLP) sample for lead shall be sampled and analyzed in accordance with EPA's SW 846 procedure. If the sample is determined to be above the TCLP threshold, the lead-containing material must be disposed of by the contractor at an off-post approved landfill that accepts lead-containing material at the contractor's expense. In the event that building material will be segregated, the waste stream will be identified and a TCLP sample shall be analyzed for Lead IAW EPA's SW 846 procedure. Only non lead-containing material may be offered for reuse.

Whole building demolition debris

Consists of all building components (painted and non-painted) to include wood, brick, cement (foundations), plaster, drywall, etc. that are torn down during demolition and collected for disposal. Waste characterization is based on analyses of samples that are "representative" of the waste. Therefore, proportionate quantities of the various structural components can be obtained (e.g., by coring or drilling through the materials) and combined for analyses in accordance with the TCLP requirements.

Partial Demolition (Building Renovation)

May consist of a variety of components (painted and non-painted) such as those in whole building demolition debris, but does not entail entire building/structure. Same sampling procedures as discussed above may be used. A second option involves careful predetermination and characterization of the individual components to allow for special waste handling and segregation procedures during the operations. Careful segregation is more feasible for renovations/partial demolitions than for whole building demolition and may reduce the volume of hazardous waste. Where segregation is not practical for a particular operation the overall "representative" sample approach should be used. A cost analyses may be beneficial to determine waste management practices

EPAS

The Army's Environmental Performance Assessment System (EPAS) program is administered through the DPW-E Multimedia Compliance Branch. The goal of this program is to administer environmental compliance audits objectively and comprehensively, provide professional and technically correct audits, and foster environmental responsibility in all personnel who can affect the environment at Fort Bliss. EPAS staff will coordinate with the appropriate construction project personnel to schedule audits.

HAZARDOUS MATERIAL

Definition

Any item or chemical which is a "health hazard" or "physical hazard" as defined by the Occupational Safety and Health Act (OSHA) in 29 CFR 1910.1200, which includes the following:

- (1) Chemicals which are carcinogens, toxic, or highly toxic agents, reproductive toxins; irritants, corrosives, sensitizers, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucus membranes.
- (2) Chemicals which are combustible liquids, compressed gases, explosives, flammable liquids, flammable solids, organic peroxides, oxidizers, pyrophorics, unstable (reactive) or water-reactive.

(3) Chemicals which in the course of normal handling, use, or storage operations may produce or release dusts, gases, fumes, vapors, mists or smoke which have any of the above characteristics.

(4) Any item or chemical which is reportable or potentially reportable or notifiable as inventory under the requirements of the Hazardous Chemical Reporting (40 CFR 370), or as an environmental release under the reporting requirements of the Toxic Chemical Release Reporting: Community Right To Know (40 CFR 372), which include chemicals with special characteristics which in the opinion of the manufacturer can cause harm to people, plants, or animals when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other receptacles).

(5) Any item or chemical which, when being transported or moved, is a risk to public safety or an environmental hazard and is regulated as such by one or more of the following:

- (a) Department of Transportation Hazardous Materials Regulations (49 CFR 100–180).
- (b) International Maritime Dangerous Goods Code of the International Maritime Organization.
- (c) Dangerous Goods Regulations of the International Air Transport Association.
- (d) Technical Instructions of the International Civil Aviation Organization.
- (e) U.S. Air Force Joint Manual, Preparing Hazardous Materials for Military Air Shipments (AFJMAN 24–204).

Hazardous Material Storage-Interior

Any maintenance bay (Tactical Equipment Maintenance Facility (TEMF)) or other facility containing hazardous materials must allocate (in design documents) space for hazardous material storage areas (in accordance with compatibility of materials being stored). Specifically, the inside of the facility must contain a designated area for flammable lockers, and secondary containment for hazardous materials being used. Fluid distribution rooms within TEMFs require secondary containment for all hazardous materials (e.g., petroleum, oil, lubricant, and antifreeze products). Floor drains within fluid distribution rooms are not permitted.

Hazardous Material Storage-Exterior

The outside of the facility must contain a designated area for a self-contained Hazstore building (with segregated compartments to provide for storage of incompatible materials such as acids, caustics, reactive metals, reactive organic compounds, flammable solvents, and oxidizers) or buildings depending on quantities used. This area must also be able to be accessed by a 10K forklift. Hazardous material is always separated from hazardous waste and for this reason, Hazstore buildings should be considered discrete requirements for each media (materials and waste).

Best Management Practices (BMPs) for storm water require that secondary containment be provided to preclude rain flows from carrying hazardous material contaminants.

Roofs are BMPs that are usually built over these secondary containment areas to preclude evacuation of rain waters after each event from containment area. Unroofed areas have valves that allow rain water release from containments but are problematic because units leave valves open continuously to avoid opening and closing the valves after rain events. These areas are usually secured by fencing by the unit to protect costly materials for accountability reasons.

HAZARDOUS WASTE

Definition

A waste identified in Section 3, Part 261, Title 40, Code of Federal Regulations (40 CFR 261.3) or applicable foreign law, rule, or regulation.

Hazardous Waste Generation-Contractor

Hazardous waste generated incidental to the execution of service or construction contracts should be disposed of by the contractor performing the basic contract, at the contractor's expense, using the installation's generator identification number on the manifest. Such actions must be coordinated with the installation environmental coordinator and documented in writing.

Hazardous Waste Storage

Definition

As defined in 40 CFR 260.10, the holding of hazardous waste for a temporary period, at the end of which the hazardous waste is treated, disposed of, or stored elsewhere.

Description

Storage of hazardous waste requires control, segregation of compatibles, and secondary containment. HazStor buildings are preferred by DPW-E because they set a standard for storage and send a clear message that hazardous waste is highly regulated. Non-compliance with hazardous waste storage regulations results in expensive fines (\$15,000/day). HazStor buildings are weather tight, have ramps, secondary containment, shelving, and barriers to separate incompatibles. Although HazStor buildings are not required, their characteristics must be incorporated into all hazardous waste storage designs. Any new construction designs should include ramping (drums are heavy), material incompatibility (physical barriers), secondary containment, control, and proper signage. Two HazStor modulares (12'x24'); one being 3-compartments, and one being a single compartment is sufficient for each side of the current 2-sided motorpools.

HISTORICAL ARCHITECTURE

DPW-E maintains a list of buildings that require review under Section 106 of the National Historic Preservation Act prior to expenditure of funds for modification, repair,

renovation, or other change to the interior or exterior, including landscape. New construction and exterior renovations to existing facilities not on the list also requires review if the facility is within the viewshed. Contact DPW-E prior to starting work on any project involving new construction or changes to existing facilities or landscapes.

LANDSCAPING (AT ANY BUILDING)

Implementing the following recommendations will promote long term success resulting in water conservation, reduction in expenditures, and fewer maintenance needs.

(1) Use species from the “Top 10 Trees for Fort Bliss Landscape Projects” poster (copies available upon request). Tree selections include Honey Mesquite (*Prosopis glandulosa* var. *glandulosa*), Chinese Pistache (*Pistacia chinensis*), Western Soapberry (*Sapindus drummondii*), Honey Locust (*Gleditsia triacanthia* var. *inermis*), Desert Willow (*Chilopsis linearis*), Afghan Pine (*Pinus eldarica*), and Escarpment Live Oak (*Quercus fusiformis*). These species are “water smart” plants, have fewer pests (if any), and once established, require little of no fertilization and will increase the chances for long term landscape success. These trees are either native or adaptable to the arid environment of Fort Bliss.

(2) An exhaustive list of low-water use trees, shrubs, and other plant options for our region can be consulted on species lists prepared by El Paso County, Texas. The Environmental Division has copies of these lists as well.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

All construction actions must undergo NEPA analysis prior to project ground-breaking. NEPA reviews may include project designs, specifications, and plans. A complete description of the action should be presented at the time of the generation of the 1391. The Fort Bliss NEPA Team will review and then generate a Tab J for the project that may include NEPA documentation. If the proposed action has been reviewed in previous documentation, that documentation must be supplied. If the project is part of a wider action or if project descriptions indicate a potential for significant action or for not meeting the screening criteria as set forth in 32 CFR 651.29, then the Tab J will not include the requisite NEPA documentation. Funding for separate NEPA analysis will then need to be obtained by you or the proponent through the proper funding process. This NEPA documentation can be at the level of an Environmental Assessment (EA) or an Environmental Impact Statement (EIS), so early planning is essential. The NEPA Coordinator, with concurrence of the NEPA Board, can assist in determining the level of analysis required, generating the proper documentation, and if possible, in changing the proposed action to one that will require a lower level of environmental review.

PESTICIDES

Pesticides are chemicals designed to kill a variety of pests, pose a health risk if mishandled, and are highly regulated. Only certified applicators that are coordinated with the Installation Pest Management Program (IPMP) are allowed to handle and apply

pesticides at Fort Bliss. Technicians are not approved to apply pesticides on the installation.

All contracts involving pesticide applications must be coordinated with the Installation Pest Management Coordinator (IPMC) at DPW-E. The types and amounts of pesticides used on the installation must be recorded and submitted to the IPMC using the IPMP formats.

PETROLEUM STORAGE TANKS

Automated Used POL Collection Systems

In the past, automated, pneumatic used oil and used antifreeze collection systems have been installed in several TAC shops. These systems have had numerous problems and have not worked well for Fort Bliss.

These systems are high maintenance and very expensive to repair. Common problems include but are not limited to:

- (1) The system continues to pump used oil/antifreeze into the Aboveground Storage Tank (AST) until it overflows or squirts fluid out thru the tank vent.
- (2) The collection sump overflows because the sensor in the sump does not trigger the pump. The expense to replace the pressure sensor device alone was \$5,000 at one site.
- (3) The underground lines get plugged-up from the debris in the used oil and antifreeze.
- (4) The underground lines need to be tightness tested annually and if they fail, the floor must be torn up to repair them. Cathodic protection is required for steel POL lines buried in concrete but these lines do not have it. All POL lines need to be installed aboveground to avoid these issues.

Automated systems are over-engineered and rely too heavily on mechanical devices that fail. There needs to be human involvement in the disposal of these used POL fluids to prevent spills and releases to the environment. In summary, these systems are too automated, resulting in lack of attention toward environmental issues.

The design plans usually refer to the used oil and antifreeze as “waste” oil and “waste” antifreeze. When the systems are installed, the word “waste oil” or “waste antifreeze” is usually painted on the tanks and piping. When a state or federal regulator sees the word “waste oil” he assumes that the oil is hazardous and contains solvents or other constituents besides oil. Therefore, label all used oil above ground oil tanks as “USED OIL”, and used antifreeze labeled as “USED ANTIFREEZE”.

Even if an AST has an automatic tank monitor (like a Veeder Root brand ATG), it should also have a visual gauge on the tank so that personnel can easily check the fluid level at a glance. This helps to prevent overfills and spills of used POL. If this gauge is a Morrison Clock Gauge, ensure that the gauge has a marking to indicate the capacity for the tank. Many people do not know how to read a clock gauge so they cannot tell when it is full. A simpler gauge that shows ¼, ½, ¾, Full is preferable.

Petroleum Storage Tanks

- (1) The used oil and antifreeze collection systems that have been installed in several motor pools at Fort Bliss are not well designed and have not worked well. They require frequent, expensive repairs and they also cause frequent overflows of their aboveground storage tanks. A better design is needed. Perhaps the best plan would be a simpler one where the soldiers empty the used POL into an AST by hand.
- (2) If fuel tankers are to be parked at motor pools, they need to have a secondary containment that will hold the contents of the largest tanker in the containment plus about 10% for rainwater. The containment needs to have a lockable drain on the low side to remove rainwater.
- (3) Underground Storage Tanks (USTs) are highly regulated and environmentally risky. ASTs make more sense.
- (4) Underground piping is an additional environmental burden. They need to be cathodically protected to prevent corrosion and they need to be tested for leaks annually. Try to avoid installing underground piping for POL.
- (5) Aboveground POL tanks should have double-wall construction, spill/overflow protection, and a release monitoring system (automatic tank gauge with alarm). The alarm should be located where someone can hear it. These tanks are the object of continuous fill/pump operations. A staircase adjacent to the tanks to make it safer for additions of fluids is appropriate. Currently, heavy 5 gallon containers are raised over the head making it unsafe and also more risky for spills. Secondary containment berms around the tanks are a good idea; spills can be contained in a limited area and easily cleaned up.
- (6) Aboveground POL tanks need to be located on a concrete pad. Even double-wall ASTs are prone to overfills and spillage so they need to be situated on a paved surface to avoid expensive cleanups of contaminated soil.

STORM WATER

Guidance for Construction Storm Water Pollution Prevention Plans (SWP3's) & Permits

Spills - All potentially polluting material should be labeled and stored in original containers where possible and be sealed or covered to prevent contact with storm water or storm water runoff. MSDS's of all materials must be maintained on site. A list of these materials should also be included in the SWP3. All spills or releases of hazardous waste, materials, fuels, oils or lubricants should be reported to Fort Bliss Fire Department (915) 568-1117 or (915) 568-5283. The Fire Department will notify other Fort Bliss entities including Environmental Division which will notify regulatory authorities if reportable quantity thresholds are exceeded.

Storage Tanks - Storage of liquid materials, including fuels, requires impervious secondary containment equal to 110% of stored capacity. A spill response kit shall be maintained at each fuel storage and dispensing location. Drip pans or other temporary containments shall be used during fuel transfers to prevent leaks at the most vulnerable locations; for example hose couplings and beneath the nozzle at the point of transfer to the vehicle. Any rain water accumulated in secondary

containments must be considered contaminated if oil or oil sheen is visible. Disposal of contaminated rain water must be coordinated with the installation the Petroleum Storage Tank Manager (915) 568-6959 or Storm Water Manager (915) 568-0794.

Disposing of hyper chlorinated water - During disinfection of newly installed waterlines, chlorinated water to be discharged to the environment (or storm water conveyance system) shall be neutralized to achieve a maximum residual chlorine concentration of 4 parts per million, in accordance with AWWA standard C651.

Construction Water Service - The Fort Bliss Water Services Company ((915) 569-5360) shall designate a hydrant or stand pipe to assist contractors during construction. A water meter and an approved backflow prevention assembly shall be maintained at all times of operation at the hydrant or standpipe. The water fill area shall be designed and maintained to insure that water does not accumulate causing a vector attractant or erosion. All backflow prevention assemblies shall be tested for proper operation by a backflow prevention technician registered with the Cross-Connection Control Program Manager (CCCM). Contact the CCCM at (915) 569-5359 to schedule testing. Testing shall take place at the time of installation, repair, or relocation and at least on an annual schedule thereafter or more often when required by the Cross-Connection Control Program Manager.

Hazardous Waste – Construction Site Operators must contact the Environmental Division, Hazardous Waste Program Manager for installation policies and guidance on hazardous waste management prior to accumulation of any HW waste at their sites. The Construction Site Operator is responsible for complying with state/federal hazardous waste management regulations, installation permit provisions, and installation HW Management Plan and SOPs and must provide the HW Program Manager with their waste transporter and disposal facility EPA identification numbers. Hazardous waste generated as result of construction or other activities on Fort Bliss property must be disposed of under authority of the Fort Bliss permit number and manifests must be signed by an authorized Fort Bliss Representative. Review and signature of the manifest must be scheduled with the Hazardous Waste Program Manager at (915) 569-6393 or (915) 568-7041.

Solid Waste / Recycling - The Fort Bliss landfill is only accessible to those contractors with a permit issued by the Directorate of Public Works, Building 777. All military construction, renovation and demolition projects shall include contract performance requirements for a 50% minimum diversion of construction and demolition (C&D) waste by weight, from landfill disposal. Contract specifications will include submission of a contractor's C&D Waste Management Plan prior to the start of site clearance. All weight tickets for materials resold, recycled or reused will be reported to the Environmental Division, solid waste program manager.

Air / Dust Control - Water shall be applied at all construction/demolition sites to include unpaved roads for egress and ingress, staging and storage areas, stockpiles and debris piles, and parking lots for employees and workers. Dust shall be controlled during earth work, grading, and related activities that can create dust. All open-bed trucks shall have a cover or tarp to control dust when handling or hauling earth, aggregate or debris. Crushed rock, gravel or crushed asphalt can be used or applied on in-plant or on-site roads, staging areas, and or park areas to minimize water usage and control dust.

Waste Water - No foreign items, construction debris, chemicals, oils, etc., shall be introduced into the sanitary sewer collection system. Storm water runoff shall be directed away from the sanitary sewer collection system and storm water shall not be disposed into the sanitary collection system. State licensed temporary toilet facilities (i.e. Porta Potties) shall be utilized. There shall be no temporary toilet vaults or septic tanks installed without proper authorization from ENVIRONMENTAL DIVISION.

Document Submission Requirements - A copy of the completed SWP3 including planned start and stop dates, completed NOI and copy of actual construction general permit to should be provided to:

Directorate of Public Works

Master Planning

Attn: IMWE-BLS-PWM (Bldg. 777)

Pleasanton & Chaffee Roads

Fort Bliss, TX 79916

(915) 568-2757, 5949, or 5933

The City of El Paso and Fort Bliss storm water conveyance systems are interconnected. As a result, a courtesy copy should also be provided for informational purposes to the City of El Paso,

Kareem Dallo, P.E. or Ziad Al-Dasouqi, P.E.

Development Services Department

City Hall, 5th floor

2-Civic Center Plaza

El Paso TX 79901

Off: (915) 541-4788

Additional Information - Question regarding storm water pollution prevention plans on Fort Bliss should be directed to Mr. Kelly Blough, Multimedia Compliance Branch, Construction Storm Water Program Manager, Environmental Division, Attn: IMWE-BLS-PWE (Bldg 622), Pleasonton & Taylor Roads, Fort Bliss, TX 79916, (915) 568-0794 (kelly.blough@us.army.mil) or Mr. Jack Lady (915) 568-0558 (jack.lady@us.army.mil).

Summary of Fort Bliss – Texas Construction Permitting Requirements

Area of Soil Disturbance	Regulatory Requirements
Less than 1 acre	Construction SWP3 and notice to state not required.
1 to less than 5 acres	Construction SWP3 is likely required though some short duration projects may qualify for waiver. SWP3 or waiver request must be coordinated through Environmental Division.
5 acres and greater	Construction SWP3 is required and must be coordinated through Environmental Division. NOI form and fee must be submitted to Texas Commission on Environmental Quality.

SWP3 = Storm Water Pollution Prevention Plan – Document following Texas Commission on Environmental Quality approved format that details the project and efforts to prevent migration of pollutants from construction site.

NOI = Notice of Intent – Texas Commission on Environmental Quality form that a construction site operator submits to the state in order to receive construction site permit coverage.

Summary of Fort Bliss – New Mexico Construction Permitting Requirements

Area of Soil Disturbance	Regulatory Requirements
Less than 1 acre	Construction SWP3 and notice of intent not required.
1 to less than 5 acres	Construction SWP3 is likely required though some short duration projects may qualify for waiver. SWP3 or waiver request must be coordinated through Environmental Division.
5 acres and greater	Construction SWP3 is required and must be coordinated through Environmental Division. NOI form and fee must be submitted to US Environmental Protection Agency Region VI.

SWP3 = Storm Water Pollution Prevention Plan – Document following USEPA region VI approved format that details the project and efforts to prevent migration of pollutants from construction site.

NOI = Notice of Intent – Federal form that a construction site operator submits to the USEPA Region VI in order to receive construction site permit coverage.

SOLID WASTE MANAGEMENT & RECYCLING

Construction Waste Management-Reporting Landfill Diversion

Army policy dated Feb. 06, 2006 states that all military construction, renovation, and demolition projects shall include contract performance requirements for a 50% minimum diversion of construction and demolition waste by weight, from landfill disposal. Contract specifications shall include submission of a contractor's C&D Waste Management Plan. Plan & diversion weights shall be submitted to the Solid Waste Program Manager, Directorate of Public Works-Environmental Division.

Recycling

Fort Bliss has single-stream recycling. This means that all recyclables will go into one container; no segregating. Papers (white, bagged shredded paper, magazines, cardboard, colored paper, newspapers), plastics (#1 and #2) and metal (tin & aluminum cans) all go into any blue recycling container (no more separating). Blue, deskside recycling containers are available by calling the Recycling Center at 568-1537. If your building has custodial service, the custodians will empty your recycling desk-side bin once a week. If you do not have custodial service, personnel will need to empty their recycling desk-side bins into the new outdoor recycling dumpster.

Any building that has a trash dumpster outside will also have a recycling dumpster. Architects-engineers (A-E) need to remember to include space outdoors for a recycling dumpster. Dining facilities need to include space for a roll-off because they generate lots of recyclables.

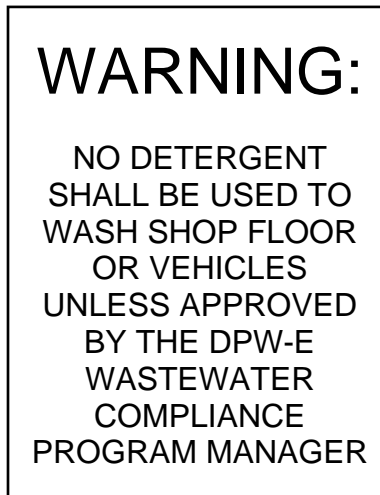
The dimensions for a recycling dumpster are 6 ft. wide X 5.5 ft deep X 6 ft. tall. The dimensions for roll-off are 22' 2" long X 7'7" wide X 6'6" tall.

WASTEWATER

Vehicle Maintenance Facilities and other repair facilities requiring washracks will have Oil Water Separators (OWS). All shop drains to the sewer systems will be placed so that they will not receive pollutants from repair activities. Repair activities (welding, painting, battery shops, grinding areas, etc.) will not produce waste streams that will find their way into the sewer drains.

OWS Signage

Proper OWS signage must also be included as described below:



(1) The oil/water separator (OWS) sign shall be approximately 2'-6" high by 2'-0" wide and white in color. Message lettering shall be all caps in black Helvetica and a minimum of 1-1/2" high. "WARNING" lettering shall be all caps in black Helvetica and a minimum of 3" high.

(2) The Contractor shall provide a minimum of two (2) signs per building for small and medium TEMFs and four (4) signs per building for large and extra large TEMFs. There shall be no less than one (1) sign centrally located per every four repair bays (eight repair work areas) and with no less than one (1) sign per side of building.

(3) Sign shall be permanently secured to the wall or structure with the bottom of sign at approximately 4'-0" above finished floor near the floor trench drains.

Dining Facilities/Kitchens must have grease traps and associated equipment to comply with local Fats, Oils, and Greases (FOG) requirements per El Paso Water Utilities Rule #15.

El Paso Water Utilities Public Service Board (PSB) Rule No. 9, together with applicable provisions of Rules and Regulations No. 1, No. 5, No. 6, and No. 15 set forth the uniform requirements for the discharge by any person of wastewater into El Paso's wastewater system.

Rule No. 9 states that no user shall discharge or cause to be discharged into El Paso's wastewater system any pollutant or wastewater except in conformity with Rule No. 9, the requirements of the act, the General Pretreatment Regulations in 40 C.F.R. Part 403, and applicable state laws. Rule No. 9 lists prohibited discharges, local pollutant limits, pre-treatment requirements, permitting requirements, permit conditions, reporting and monitoring requirements. Any discharges into the wastewater system must first be cleared by the Fort Bliss DPW-E.

Vehicle washing will be performed on approved wash racks where drains discharge through an Oil Water Separator. Washing that generates pollutants that exceed local wastewater limits and prohibited discharge standards must have appropriate controls to remove those pollutants prior to entering the sewer system. Vehicles that are excessively dirty (large amounts of mud or excessive amount of greases and oils) must be washed at the Central Wash Vehicle Facility to prevent from overloading the smaller motor pool wash racks.

Septic Tank and Leach Field Systems that are required because of the lack of connection to the sanitary sewer will only receive domestic type wastewater. No industrial or industrial like wastewater discharges (wash racks, defueling stations, OWS, etc) may be disposed into the septic tank. Septic Tanks, holding tanks and leach fields will not be authorized if a sanitary sewer tie-in is nearby. Septic tanks do not require a permit in the New Mexico Ranges but must be built to New Mexico standards.

WATER QUALITY

Potable Water Regulatory Policy

The Fort Bliss Water Services Company (FBWS) operates 9 water systems on Post: Fort Bliss Main Post, Biggs Army Air Field, Site Monitor, McGregor/Meyer Range Camp, Dona Ana Range Camp, Oro Grande Range Camp, Hueco Range Camp, SHORAD, and Redeye. The Directorate of Public Works (DPW) operates the Brigade Combat Team Facilities (BCTs) aka: East Biggs Water System, and the Combined Aviation Brigade Area (CAB) water system which is part of the Biggs AAF water system. DPW and FBWS are responsible for protecting the drinking water supply in accordance with State Regulations (Title 30 Texas Administrative Code 290.46(j), New Mexico Administrative Code 20.7.10.400(L)) from contamination or pollution which could result from improper water system plumbing construction or configuration. This policy only applies to the areas of the water system under the purview of the DPW. FBWS is responsible for their own policy for areas under their purview. Therefore, construction projects requiring potable water from the FBWS owned water system must be coordinated through FBWS, otherwise the following is applicable:

Customer Service Inspection certificates shall be completed prior to providing continuous water service to new construction or after significant plumbing renovations on any existing service or any existing service when the DPW has reason to believe that cross-connections or other potential contaminant hazard exist or after any material improvement, correction, or addition to the water distribution facilities which are under their respective purview. As unacceptable plumbing practices are discovered, they shall be promptly eliminated to prevent possible contamination of the water supply. Also, any backflow prevention devices installed shall be installed in accordance with the Fort Bliss Cross-Connection Control Manual (FBCCCM), and tested in accordance with the FBCCCM. Copies of the FBCCCM are available from the DPW-E Water Quality Manager.

The following practices are prohibited:

- (1) No direct connection between the public drinking water supply and a potential source of contamination is permitted. Potential sources of contamination shall be isolated from the public water supply in accordance with the FBCCCM.
- (2) No cross-connection between the public water supply and a private water system is permitted. These potential threats to the public drinking water supply shall be eliminated at the service connection by the installation of an air-gap or a reduced pressure-zone backflow prevention device.
- (3) No connection which allows water to be returned to the public drinking water supply is permitted.
- (4) No pipe or pipe fitting which contains more than 8.0% lead may be used for the installation or repair of plumbing at any connection which provides water for human use.
- (5) No solder or flux which contains more than 0.2% lead can be used for the installation or repair of plumbing at any connection which provides water for human use.

This policy applies to work completed on all Fort Bliss facilities whether work is done by contract or in-house. Activities must insure that their contractors/subcontractors follow this requirement.

Inspectors must possess proper credentials and be recognized as capable of conducting a customer service inspection certification by the State of Texas. Customer Service inspections may be performed by the following group members:

- (1) Plumbing Inspectors and Water Supply Protection Specialists licensed by the Texas State Board of Plumbing Examiners.
- (2) Customer Service Inspectors licensed by the Texas Commission of Environmental Compliance (TCEQ).

Recognized Backflow assembly testers must possess a current license from the TCEQ.

Submit completed customer service inspection and/or backflow test forms to:

Directorate of Public Works Environmental Division (DPW-E)

IMWE-BLS-PWE

Bldg 622

Attn: Water Quality Manager

Fort Bliss, Texas 79916

Completed forms may also be submitted in person at Building 622, or by fax at 568-1333. Forms will be maintained by the DPW-E for a minimum of 10 years and be made readily available for review by the State regulatory entity.

Lawn Irrigation

A person may not sell, design, consult, install, maintain, alter, repair, or service irrigation in the state of Texas unless the person is licensed by the Texas Commission on Environmental Quality (TCEQ). A person who is licensed as an installer may only connect an irrigation system to a water supply while being under the direct supervision of a licensed irrigator.

POINTS OF CONTACT

Air Quality 915-568-5724
Archeology 915-568-6746/6999
Asbestos/Lead Paint 915-568-0931
EPAS 915-568-7578/569-6297
Hazardous Materials 915-568-6989
Hazardous Waste 915-568-7041
Historical Architecture 915-568-3134/7464
Landscaping 915-568-6977
NEPA 915-568-3908
Pesticides 915-568-6977
Storage Tanks 915-568-6959
Storm Water 915-568-0794
Solid Waste Management & Recycling 915-568-5724
Wastewater/Water Quality 915-568-0558

APPENDIX F

CONCEPTUAL AESTHETIC

CONSIDERATIONS







20751

JOSHUA W. SOTO
PHYSICAL FITNESS CENTER

APPENDIX G

GIS DATA

NOT USED

APPENDIX H

EXTERIOR SIGNAGE

Exterior Signage

All signs will either be pre-manufactured from materials meeting or exceeding the EPA required minimum recycled content or fabricated by DPW. Low quality and “homemade” signs are prohibited.

Locate signs where they are visible and unobstructed.

All signs use Helvetica. Exceptions to be approved by DPW.

Traffic signs will follow guidelines in the Federal Highway Administration’s “Standard Alphabets for Highway Signs and Pavement Markings” standards.

Sign Mounting and Location

Locate identification signs typically at building entrances and/or other parts of the building visible from the main access street. Building signs should be visible from the main circulation paths to the building (vehicular or pedestrian).

Place building and/or facility identification signs within the first 20 percent of the distance closest to the road between the road and the building. These signs shall be placed so as not to obscure any other identification, information or vehicular regulatory signs.

The minimum distance between sign and driveway or intersection should normally be 100 feet.

Mounting Signs on Buildings.

No sign may be mounted on the outside of the door, except small signs (one square foot or less) that indicate required use of an alternate entrance.

No sign may be attached or mounted to roofs and parapets.

No sign shall be painted or applied directly onto the surface of a building.

No permanent signs shall obstruct any window, door, fire escape, ladder, or opening intended for light, air, or egress.

No sign shall interrupt the vertical and horizontal features of the façade.

No sign may be attached to utility poles except for pole identification or warning.

Sign Descriptions:

Building Number: 30-inch by 10-inch reflective white metal panel with 8-inch black Helvetica Regular letters.

Identification Signs shall be per Technical Manual (TM) 5-807-10, Signage. Type B and Type C shall be brown metal mounted on brown metal posts. Colors shall be white letters and numbers on standard brown background. Include the Building Number and Street address such as “2475 Defense Av”.

No Smoking Signs

Provide and install No Smoking Signs (as shown in Figure 1) at all exterior doors.

Provide and Install “DESIGNATED SMOKING AREA” signs at Designated Smoking Areas. Designated Smoking Areas are to be located no less than 50 feet from any point of ingress / egress or any outside air intake.

(Figure 1 follows on next page.)

NO SMOKING



**Except in
Designated
Smoking Areas**

Sign should be posted *ONLY* at entrance(s) to Department of the Army owned or controlled buildings/facilities.

DA FORM 5560, APR 2007

APD v1.00

APPENDIX I

ACCEPTABLE PLANTS LIST

NOT USED – NO REQUIREMENTS

APPENDIX J

SITE DRAWINGS

SEE SEPARATE PDF FILE FOR COMPLETE DRAWING SET

APPENDIX J

DRAWINGS

Table of Contents

- 1) Exhibit A – General Notes**
- 2) Exhibit B – Geotechnical Bore Locations**
- 3) Exhibit C – Site Survey**
- 4) Exhibit D – Proposed Grades**
- 5) Exhibit E – Utilities**
- 6) Exhibit F – Haul Route and Staging Area**
- 7) Exhibit G – LEED Boundary**
- 8) Exhibit H – Building Envelope**

Note: These drawings are provided for overview only. The bidder shall refer to the separate pdf file for the complete set of site drawings.

S:\WORK\08/30/2010 12:08PM (4) PROJ\EXHIBITS\EXHIBIT A - GENERAL NOTES\INDOOR AQUATICS CENTER RFP - EXHIBIT A - GENERAL NOTES.dwg

GENERAL NOTES

NOTE: These requirements supersede those listed in Sections 01 10 00.6.3 and 01 10 00.6.4.

6.3 SITE PLANNING AND DESIGN

6.3.1. General Coordinate Site Planning and Design with the Land Development Engineer (LDE) and USACE for compliance with program intent. Perform Site Work in accordance with the Indoor Aquatics Center Site Infrastructure & Landscape Design Package 97 drawings and specifications, hereinafter referred to as "Site Package," to be distributed by USACE as a supplemental and separate document to this RFP document. Limits of construction are as shown in the Site Package.

6.3.1.1 The DB Contractor is responsible for any specific site preparation required to accommodate the proposed foundation design.

6.3.1.2 The Site Exhibits in Appendix J include a plan showing an area adjacent to the building labeled "Building Envelope." The landscaping, hardscape, and utility locations within this area are schematic in nature and may be relocated to accommodate the final building footprint. All utility connection points are fixed at Gulf Victory Way and Constitution Ave. In addition, any utility running through the "Parking Envelope" is fixed. The Design Builder is responsible for any cost associated with the site design and landscape design within the "Building Envelope" space. The Design Builder is responsible for any cost associated with changes to existing landscaping (walkways, landscaping, site furnishings, etc...) along Gulf Victory Way and Constitution Ave required to make connections with existing work. The Design Builder is also responsible for any cost associated with changes to the dumpster and service access drive locations to accommodate placement of the proposed facility.

6.3.1.3 Do not waste excess soil within the project site limits; deposit waste material as indicated in the Site Package.

6.3.1.4 Coordination. Coordinate between the Land Development Engineer (LDE) and USACE regarding issues relating to site and facility design and functionality.

6.3.2. Site Structures and Amenities

6.3.2.1 Provide site structures and amenities as shown on the Site Package.

6.3.2.2 See Appendices AA and GG for additional requirements for Site Structures and Amenities.

6.3.3. Site Functional Requirements

6.3.3.1. Stormwater Management (SWM) System

(a) Storm Water Management - Provide construction storm water management for the project.

(b) Fort Bliss maintains a TCEQ Multi-Sector General Storm Water Permit (TXR050000) for industrial activities at the post and a Phase II Small (MS4) General Permit (TXR040000) for operation of the installation urban MS4.

(c) Graded Slope and Fills: The angle for graded slopes and fills shall be no greater than the angle that can be retained by vegetative cover or other adequate erosion control devices or structures generally not to exceed 3:1 slope. In any event, slopes left exposed will, within 21 calendar days of completion of any phase of grading, be planted or otherwise provided with temporary or permanent ground cover, devices, or structures sufficient to restrain erosion. The angle for graded slopes and fills must be demonstrated to be stable. Stable is the condition where the soil remains in its original configuration, with or without mechanical constraints.

(d) Final Inspection. When all construction on the project is complete, the Erosion and Sediment Control Inspector will evaluate the site and all permanent erosion control features, permanent ground cover and off-site impacts to other properties. If found to be in compliance, a close-out letter will be issued.

6.3.3.2. Erosion and Sediment Control

The Texas Pollutant Discharge Elimination System (TPDES) oversees the Stormwater Sediment and Erosion Control Management Plan for the post. Comply with requirement general permit number TXR150000. Provide and maintain the SWPPP over the life of the project. Qualifying construction activities (greater than 1 acre) in the Texas portion of the installation are conducted under the TCEQ Construction General Permit (TXR150000). Construction site operators on Fort Bliss meeting the definition in the permits of primary or secondary operator must comply with the appropriate state construction general permit. Depending on the execution mechanism of the project, the construction site operator may be all, or a combination of the Directorate of Public Works, US Army Corps of Engineers, the Land Development Engineer, Design Build contractor or other entities meeting the definition.

6.4 SITE ENGINEERING

6.4.1. The existing site survey for the Indoor Aquatics Center is included in the Appendix OO. After award, conduct a site survey to establish control points and a coordinate system, based on Modified Texas State Plane, 4203 Texas Central. The multiplier is .99980307629. The Design Builder may use existing control points established around the site. Refer to the Site Package for additional information. The Design Builder will be solely responsible for the use and data interrupted from the existing control points. Any discrepancies found should be brought to the immediate attention of the Contracting Officer's Representative.

6.4.2. Existing Geotechnical Conditions: See Appendix A for geotechnical data.

6.4.2.1. Borings, a boring location map, and the raw data on the subsurface conditions as described in Section 01 10 00, Section 5.2.2 are furnished as part of the RFP. Appendix A shows the boring locations overlaid on the rough grading plan. Geotechnical data and boring logs are provided for informational purposes only. Interpretation of geotechnical data is the responsibility of the Design Builder and his Engineers of Record.

6.4.3. Fire Flow Tests. See Appendix D for the results of a hydrant fire flow test to use for basis of design for Fire Flow and Domestic Water Supply.

6.4.4. Pavement Engineering and Traffic Estimates

6.4.4.1. Refer to the Site Package, sheet series C-600, and geotech information provided in Appendix A.

6.4.5. Traffic Signage

6.4.5.1. Refer to the Site Package, sheet series C-650.

GENERAL NOTES (CONTINUED)

6.4.6. Base Utility Information

6.4.6.1. Temporary Utilities: Existing and permanent utility systems are shown in the Site Package. Coordinate temporary utilities on site as needed. Truck water to the project site until new utilities are constructed. Temporary hydrants may be used as a water point sources for construction. Until electrical utilities are constructed to the project site, provide generators and any required permits for each generator for on-site electrical service. Once utilities are constructed on the project site, arrange for and bear the cost of temporary electrical power and water service. Make requests for temporary electrical power and water service, including installation of construction meters, through DPW, not directly to the utility.

6.4.6.2. Record coordinates and elevations of underground utility lines at the start and end of each line, at every 50ft in between and at any change in vertical or horizontal direction. See also Section 01 33 16, paragraph 3.7.1.6.

6.4.6.3. Permanent Utilities:

6.4.6.4. General: Construct all utilities as shown in the Site Package. Connect all utilities at the service connection at existing utility mains and at the building stubouts. Building services may be rerouted inside the "Building Envelope" as necessary to connect to final building layout pending Government review and approval.

(a) Gas - Provide final gas load and desired service size to the Government no later than 45 days prior to beginning building construction. Pipe from the stub location to the building, including providing, installing, and connecting to the gas meter. Meter specifications and details are provided in Appendix BB - Meter Specs and Details.

(b) Electricity - Provide final building electrical loads and voltage requirements to the Government no later than 45 days prior to beginning building construction. Provide building-mounted lighting suitable for illuminating the site around the building to a level of 0.5 to 5.0 fc. Prior to final connection of transformer to utility service, provide test results for the transformer to the Government.

(c) Water - Provide required water service demand to the Government no later than 45 days prior to beginning building construction. Install a backflow preventer for the domestic water system in the Mechanical Room.

(d) Fire Sprinkler Service - Verify the fire flow requirement of the new facility. Provide final building fire flow demand to the Government no later than 45 days prior to beginning building construction. Install a backflow preventer for the fire protection system in the sprinkler control room.

(e) Sanitary Sewer - Provide final building sanitary sewer design flow to the Government no later than 45 days prior to beginning building construction.

(f) Communications/Cable TV/Telephone - Telephone system conduit routing will be included in the site communication duct bank. Fort Bliss Network Enterprise Center (NEC) will provide Communications Service Plans and Capacities and Local Telephone Service Plans. No later than 45 days prior to beginning building construction, determine requirements and capacity for the facility and verify with NEC that infrastructure being provided supports the requirements and capacity of the facility.

(g) Irrigation System - Provide an irrigation system as indicated in the Site Package. Make connections to the water supply and provide all components as indicated. Connection to the Base wide controllers will be coordinated with the COR and DPW. Refer to Sheet L-390 in the Site Package for additional information.

6.4.7. Cut and Fill

6.4.7.1. Refer to the Site Package, sheet C-205, for the placement of excess soil from the site.

6.4.8. Borrow Material

6.4.8.1. Refer to Site Package, sheet G-301, for borrow material location.

6.4.9. Haul Routes and Staging Areas

6.4.9.1. A Map with haul routes, construction entrance gate, staging areas, landfill, and borrow areas is included in the Site Package. Disposal areas are off site and are the Contractor's responsibility.

6.4.9.2. Construction Trailers: The Contractor has been allotted a Lay Down Area of no more than 40,000 square feet in size as shown in the Site Package for the placement of a construction trailer complex and storage for the Contractor and all Sub-Contractors. Provide the site preparation, fencing, access drives, and ongoing maintenance of the Lay Down Area. Additional trailer space will not be allocated for Sub-Contractors and therefore must be contained within the complex. Permanent Trailers are not permitted within the site limits. Provide an access path for emergency response vehicles at the construction job site and keep it clear in the event of fire or medical emergency, per NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations.

6.4.10. Clearing and Grubbing

Not Used.

6.4.11. Landscaping

6.4.11.1. Refer to the Site Package, sheet series L-100, L-200, L-300, L-400.

6.4.12. Turf

6.4.12.1. Not used.

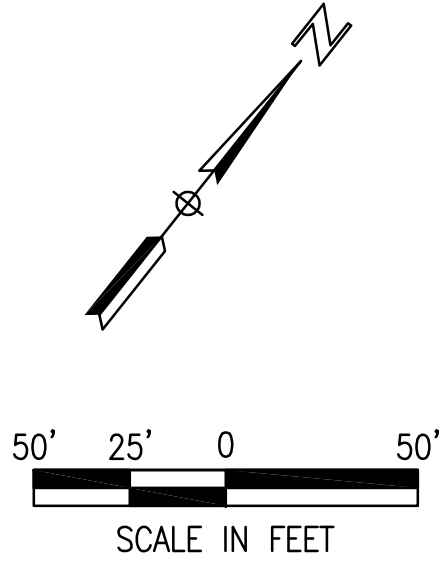











INDOOR AQUATICS CENTER
FORT BLISS, TEXAS
RFP EXHIBIT - A
GENERAL NOTES

Sheet
reference
number:
EX-A

DATE: AUGUST 30, 2010

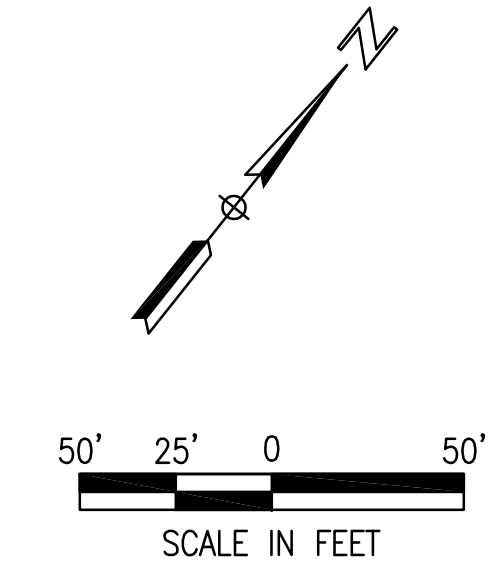
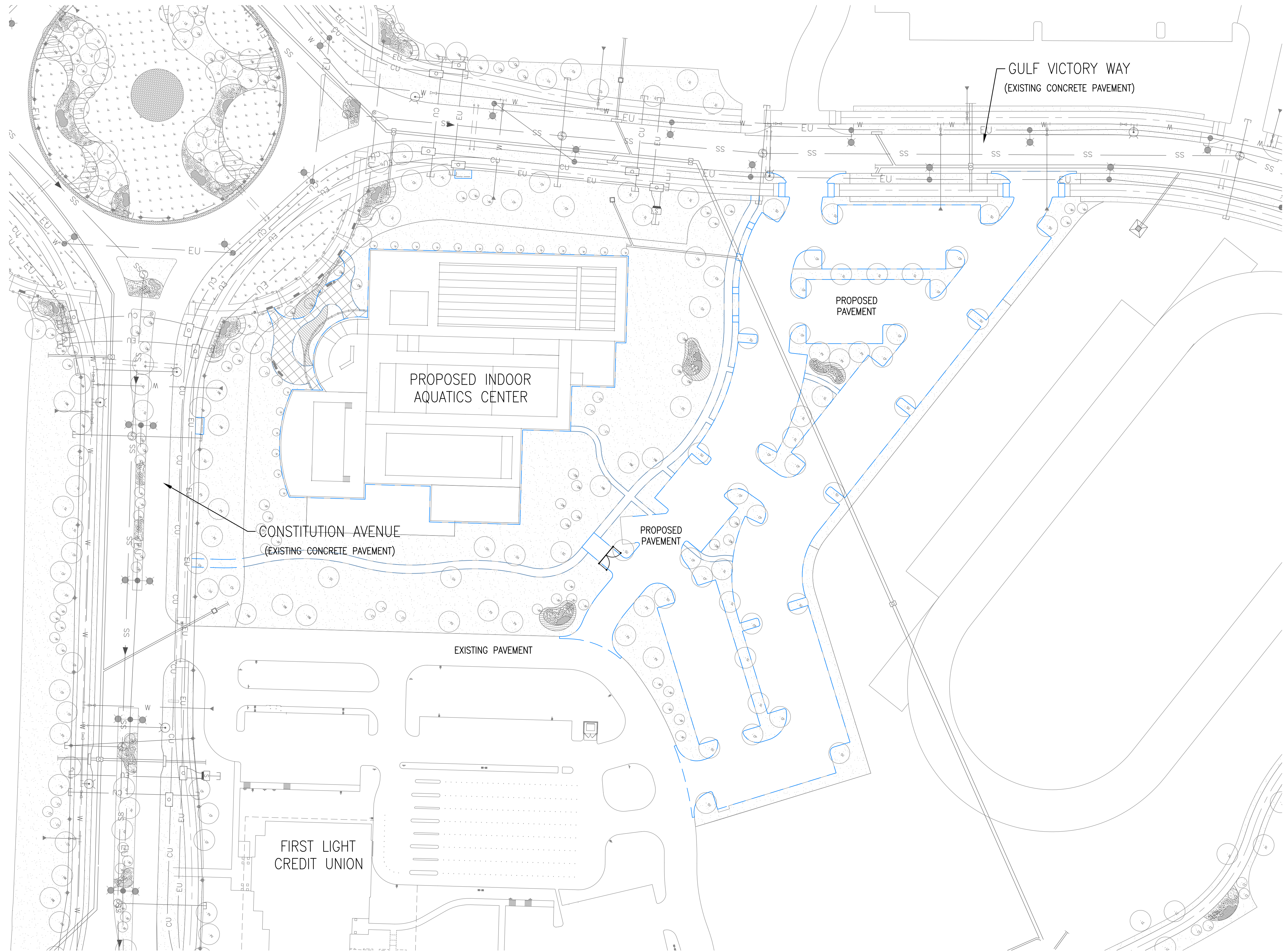
JACOBS / HITT-ZOLLARS



LEGEND:	
	XXA2S-XX BORE HOLE POINT NUMBER AND APPROXIMATE LOCATION
	10 FT IN DEPTH (TOTAL 14)
	25 FT IN DEPTH (TOTAL 10)
	30 FT IN DEPTH (TOTAL 5)
	40 FT IN DEPTH (TOTAL 3)
	DCP
	THERMAL, ELECTRIC
	3936 EXISTING CONTOUR
	3936 PROPOSED CONTOUR

DATE: AUGUST 24, 2010
JACOBS / HUITT-ZOLIARS

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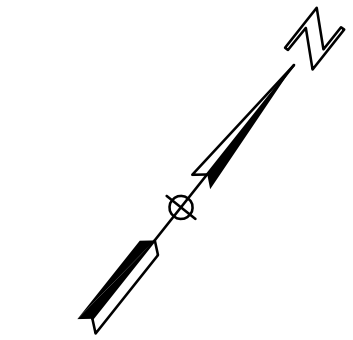


- LEGEND:
- SS — EX. SANITARY SEWER
 - W — EX. WATER MAIN
 - MG — EX. GAS MAIN
 - EU — EX. UNDERGROUND ELECTRIC
 - CU — EX. UNDERGROUND COMMUNICATIONS
 - EX. STORM MAIN

DATE: AUGUST 24, 2010
JACOBS / HUITT-ZOLLARS

INDOOR AQUATICS CENTER
FORT BLISS, TEXAS
RFP EXHIBIT - C
SITE SURVEY

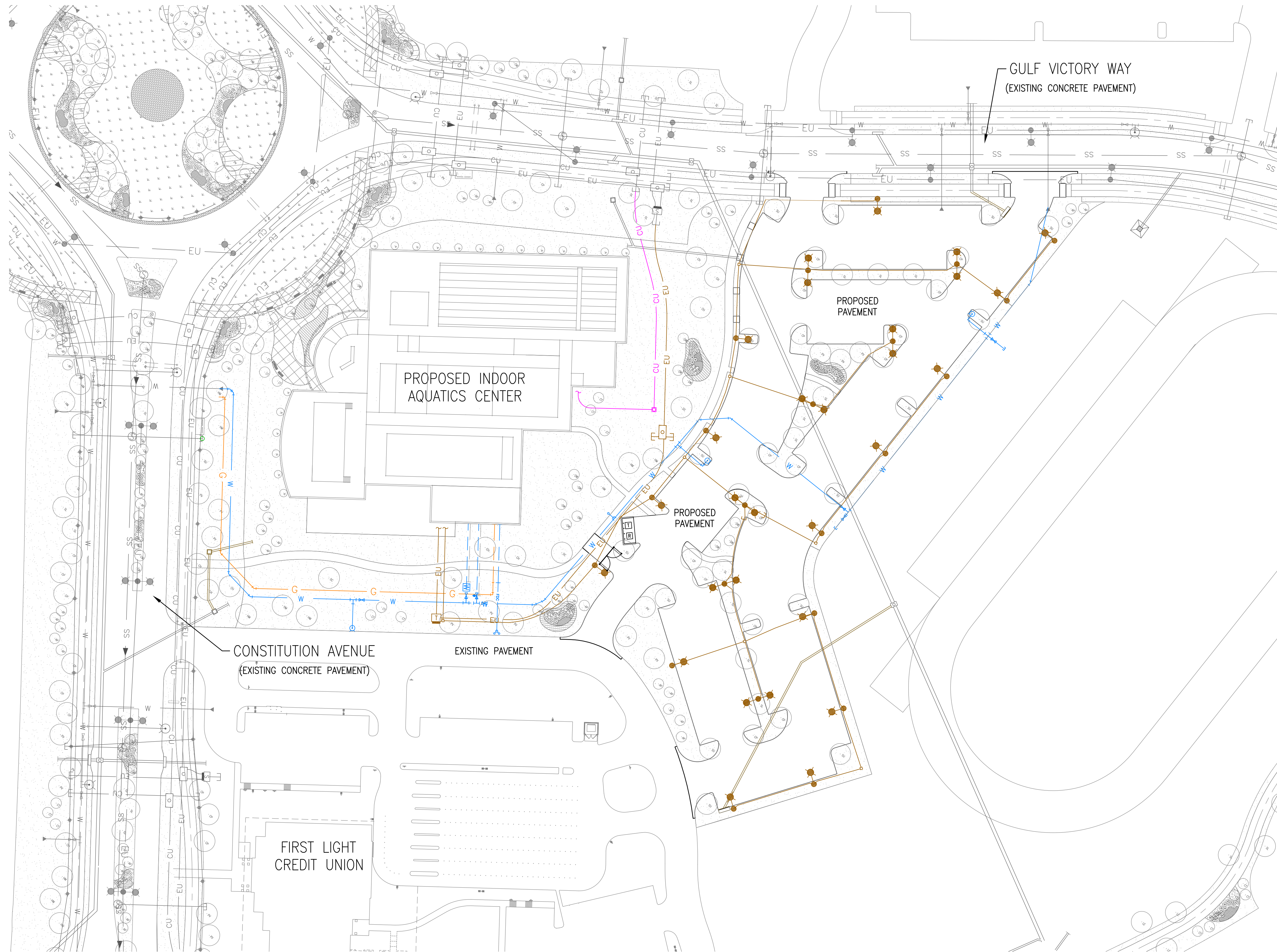
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LEGEND:

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| — EU — | EX. UNDERGROUND ELECTRIC |
| — CU — | EX. UNDERGROUND COMMUNICATIONS |
| ===== | EX. STORM MAIN |
| — 3936 — | PROPOSED CONTOUR |
| — 3936 — | EXISTING CONTOUR |
| FG | FINISHED GRADE |

DATE: AUGUST 24, 2010
JACOBS / HUITT-ZOLLARS



LEGEND:

- SS EX. SANITARY SEWER
- W EX. WATER MAIN
- MG EX. GAS MAIN
- EU EX. UNDERGROUND ELECTRIC
- CU EX. UNDERGROUND COMMUNICATIONS
- EX. STORM MAIN
- SS PROP. SANITARY SEWER
- W PROP. WATER MAIN
- MG PROP. GAS MAIN
- EU PROP. UNDERGROUND ELECTRIC
- PROP. ELECTRIC LIGHT
- CU PROP. UNDERGROUND COMMUNICATIONS
- PROP. STORM MAIN

NOTE:

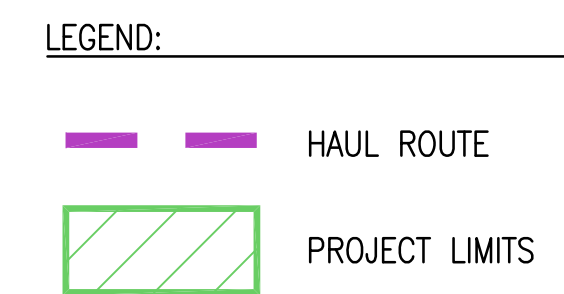
SCUPPERS AND DOWNSPOUTS WILL BE TIED DIRECTLY INTO THE UNDERGROUND STORM DRAIN SYSTEM. IN NO CASE SHALL DRAINAGE BE DIRECTED ACROSS ANY SIDEWALK.

DATE: AUGUST 24, 2010
JACOBS / HUITT-ZOLIARS

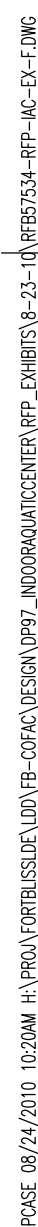
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FORT BLISS, TEXAS

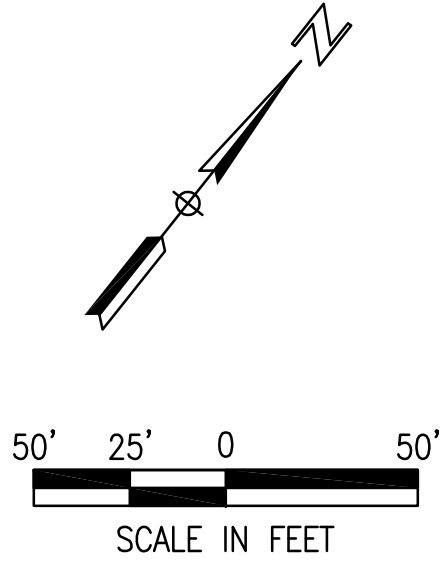
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UTILITIES

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EX-F

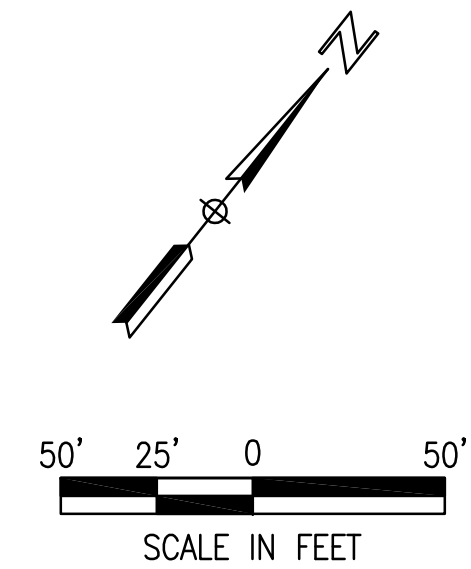




— SS — EX. SANITARY SEWER
 — W — EX. WATER MAIN
 — MG — EX. GAS MAIN
 — EU — EX. UNDERGROUND ELECTRIC
 — CU — EX. UNDERGROUND COMMUNICATIONS
 ——— EX. STORM MAIN
 ■ ■ ■ LEED BOUNDARY
 — 3936 — EXISTING CONTOUR

DATE: AUGUST 24, 2010
JACOBS / HUITT-ZOLLARS

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- LEGEND:
- SS — EX. SANITARY SEWER
 - W — EX. WATER MAIN
 - MG — EX. GAS MAIN
 - EU — EX. UNDERGROUND ELECTRIC
 - CU — EX. UNDERGROUND COMMUNICATIONS
 - — EX. STORM MAIN
 - SS — PROP. SANITARY SEWER
 - W — PROP. WATER MAIN
 - MG — PROP. GAS MAIN
 - EU — PROP. UNDERGROUND ELECTRIC
 - — PROP. ELECTRIC LIGHT
 - CU — PROP. UNDERGROUND COMMUNICATIONS
 - — PROP. STORM MAIN
 - — BUILDING ENVELOPE
 - — PARKING ENVELOPE

DATE: AUGUST 24, 2010
JACOBS / HUITT-ZOLLARS

INDOOR AQUATICS CENTER
FORT BLISS, TEXAS

RFP EXHIBIT - H
BUILDING ENVELOPE

Sheet
reference
number:
EX-H

APPENDIX K

LIFE CYCLE COST ANALYSIS

UTILITY RATES

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT BLISS
1 PERSHING ROAD
FORT BLISS, TX 79916-3803

SEP 03 2008

IMSW-BLS-PWF

MEMORANDUM FOR All Reimbursable Fort Bliss Utilities Customers

SUBJECT: New Natural Gas Rates

1. New utility rates are determined in accordance with HQ USACE Installation Support Division Policies, as spelled out in Technical Note Number 420-41 (Revision 1).
2. Natural gas prices have increased 43 percent higher than last year's price. Effective 1 October 2008, the new natural gas rates provided below will apply. Category "A" represents the rates for sales to Federal Government and Non-Appropriated Fund (NAF) activities. Category "B" represents the rates for private or commercial organizations. **NOTE:** PROPANE and STEAM will be handled on a case by case basis. The following rates shown are for metered facilities.

	Unit	A	B
Natural Gas	CCF	\$1.3810	\$1.5606

3. The following rates are for unmetered facilities whose cost is determined by the area.

	Unit	A	B
Natural Gas	SF/mo	\$0.1315	\$0.1690

4. Point of Contact for this action is Mr. Anthony Nitkowski, Utilities Sales Officer, Business Operation Integration Division, Directorate of Public Works, DSN 978-5465, email anthony.nitkowski@conus.army.mil.

A handwritten signature in cursive script, reading "David N. Shafii".

DAVID N. SHAFII, P.E.
Director of Public Works

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT BLISS
1 PERSHING ROAD
FORT BLISS, TX 79916-3803

IMSW-BLS-PWF

9 JUNE 2008

MEMORANDUM FOR All Fort Bliss Utilities Customers

SUBJECT: New Utility Rates Effective 1 January 2008

1. New utility rates were determined in accordance with HQ USACE Installation Support Division Policies, as spelled out in Technical Note Number 420-41 (Revision 1).
2. The new rates are listed below. Category "A" represents the rates for sales to Federal Government and Non-Appropriated Fund (NAF) activities. Category "B" represents the rates for sales to private or commercial organizations. **NOTE:** PROPANE and STEAM will be handled on a case by case basis. The following rates shown are for metered facilities.

	Unit	A	B
Electricity	KWh	\$0.1352	\$0.1489
Natural Gas	CCF	\$1.1328	\$1.2801
Water	KGal	\$2.9280	\$3.9409
Sewage	KGal	\$2.1410	\$2.5197

3. The following rates are for unmetered facilities whose cost is determined by the area.

	Unit	A	B
Electricity	SF/mo	\$0.3851	\$0.4351
Natural Gas	SF/mo	\$0.0920	\$0.1183
Water	SF/mo	\$0.0288	\$0.0325
Sewage	SF/mo	\$0.0289	\$0.0327

4. Point of Contact for this action is Mr. Anthony Nitkowski, Utilities Sales Officer, Business Operation Integration Division, Directorate of Public Works, DSN 979-5470, email anthony.nitkowski@conus.army.mil.

FOR THE COMMANDER:

DAVID N. SHAFII, P.E.
Director of Public Works

APPENDIX L

LEED PROJECT CREDIT GUIDANCE

APPENDIX L**REV 2.0 - 30 NOV 2008****LEED Project Credit Guidance**

This spreadsheet indicates Army required credits, Army recommendations regarding preference and avoidance of individual credits, project-specific ranking of individual point preferences, discussion of Installation roles in support of individual credits, and issues that Government Project Delivery Teams (PDTs) need to be aware of relating to individual credits. The Resources section that follows provides references and resources that relate to LEED, including policy and legal requirements, design guides and documentation resources.

LEED 2.2 Credit Paragraph	LEED Project Credit Guidance	Army Guidance: Required - Preferred - Avoid	Project Preference Ranking: (1=most preferred, blank=no preference, X=preference not applicable to this credit, Rqd=required)	
PAR	FEATURE			REMARKS
CATEGORY 1 - SUSTAINABLE SITES (14 POSSIBLE POINTS)				
SSPR1	Construction Activity Pollution Prevention (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Related to compliance with 40 CFR 122.26 (Clean Water Act).

SS1	Site Selection		X	See paragraph LEED CREDITS COORDINATION for information relating to this credit.
SS2	Development Density & Community Connectivity - OPTION 1 DENSITY		X	Credit is determined by Installation's site selection. See paragraph LEED CREDITS COORDINATION for information relating to this credit.
	Development Density & Community Connectivity - OPTION 2 CONNECTIVITY		X	Credit is determined by Installation's site selection. See paragraph LEED CREDITS COORDINATION for information relating to this credit.
SS3	Brownfield Redevelopment		X	Credit is determined by Installation's site selection. See paragraph LEED CREDITS COORDINATION for information relating to this credit.
SS4.1	Alternative Transportation: Public Transportation Access		X	Credit is determined by Installation's site selection. See paragraph LEED CREDITS COORDINATION for information relating to this credit.
SS4.2	Alternative Transportation: Bicycle Storage & Changing Rooms	Pref		
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 1			Requires provision of vehicles, which cannot be purchased with construction funds. Assume Government will not provide vehicles unless indicated otherwise.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 2	Pref		
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 3			Requires provision of vehicle refueling stations. Installation must support type of fuel and commit to maintaining/supporting refueling stations.
SS4.4	Alternative Transportation: Parking Capacity	Pref		
SS5.1	Site Development: Protect or Restore Habitat			

SS5.2	Site Development: Maximize Open Space	Pref		Assume AGMBC option for aggregated open space at another location on the installation is not available to the project unless indicated otherwise.
SS6.1	Stormwater Design: Quantity Control	Pref		Related to compliance with 40 CFR 122.26 (Clean Water Act).
SS6.2	Stormwater Design: Quality Control			
SS7.1	Heat Island Effect: Non-Roof	Pref		
SS7.2	Heat Island Effect: Roof	Pref		Coordinate with nearby airfield requirements, which may preclude this credit.
SS8	Light Pollution Reduction	Pref		
CATEGORY 2 – WATER EFFICIENCY (5 POSSIBLE POINTS)				
WE1.1	Water Efficient Landscaping: Reduce by 50%	Pref		Project must include landscaping to be eligible for this credit.
WE1.2	Water Efficient Landscaping: No Potable Water Use or No Irrigation	Pref		Project must include landscaping to be eligible for this credit.
WE2	Innovative Wastewater Technologies - OPTION 1			
WE2	Innovative Wastewater Technologies - OPTION 2			
WE3.1	Water Use Reduction: 20% Reduction	Pref		Related to Army mandate for waterless urinals beginning FY10.
WE3.2	Water Use Reduction: 30% Reduction	Pref		
CATEGORY 3 – ENERGY AND ATMOSPHERE (17 POSSIBLE POINTS)				
EAPR1	Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EAPR2	Minimum Energy Performance (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EAPR3	Fundamental Refrigerant Management (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EA1	Optimize Energy Performance	Rqd	Rqd	Earning of LEED EA1 points as indicated in paragraph ENERGY CONSERVATION, as a minimum, is required. Note that LEED points calculation is based on energy cost reduction.

EA2.1	On-Site Renewable Energy			
EA3	Enhanced Commissioning			The Commissioning Authority may be provided through the Design-Build Contractor only if in accordance with USGBC Credit Interpretation Ruling (CIR) dated 9/15/06. Commissioning Authority activities begin during design phase and continue well beyond beneficial occupancy. Assume Government will not provide CxA post-occupancy activities unless indicated otherwise.
EA4	Enhanced Refrigerant Management			
EA5	Measurement & Verification			Credit relates to EPACT metering requirements. Provider and funding of post-occupancy activities must be coordinated. Assume Government will not provide post-occupancy activities unless indicated otherwise.
EA6	Green Power		X	Credit is determined by Installation's purchase of green power. See paragraph LEED CREDITS COORDINATION for information relating to this credit.
CATEGORY 4 – MATERIALS AND RESOURCES (13 POSSIBLE POINTS)				
MRPR1	Storage & Collection of Recyclables (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Installation provides collection service and outside receptacle needs coordination.
MR1.1	Building Reuse: Maintain 75% of Existing Walls, Floors & Roof			
MR1.2	Building Reuse: Maintain 95% of Existing Walls, Floors & Roof			
MR1.3	Building Reuse: Maintain 50% of Interior Non-Structural Elements			
MR2.1	Construction Waste Management: Divert 50% From Disposal	Pref	1	See paragraph CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT for project requirement.

MR2.2	Construction Waste Management: Divert 75% From Disposal	Pref		
MR3.1	Materials Reuse: 5%			
MR3.2	Materials Reuse: 10%			
MR4.1	Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	Pref		Relates directly to EPA CPG compliance. Federal regulation as well as Federal, DOD and Army policies require purchase of products that contribute to this credit.
MR4.2	Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	Pref		Relates directly to EPA CPG compliance.
MR5.1	Regional Materials:10% Extracted, Processed & Manufactured Regionally			
MR5.2	Regional Materials:20% Extracted, Processed & Manufactured Regionally			
MR6	Rapidly Renewable Materials			Relates directly to USDA FB4P biobased materials compliance.
MR7	Certified Wood			
CATEGORY 5 – INDOOR ENVIRONMENTAL QUALITY (15 POSSIBLE POINTS)				
EQPR1	Minimum IAQ Performance (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Related to compliance with 10 CFR 434 (Federal Energy Code).
EQPR2	Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Assume all buildings are smoke free unless indicated otherwise. Family housing, barracks and other lodging are facility types where smoking may be permitted in some cases. If Statement of Work indicates smoking is permitted in these types of facilities, the requirements of LEED-NC 2.2 Option 3 apply.
EQ1	Outdoor Air Delivery Monitoring			
EQ2	Increased Ventilation			May adversely effect ability to earn energy optimization credits.

EQ3.1	Construction IAQ Management Plan: During Construction	Pref		
EQ3.2	Construction IAQ Management Plan: Before Occupancy	Pref		Construction schedule must accommodate activities required for this credit.
EQ4.1	Low Emitting Materials: Adhesives & Sealants	Pref		
EQ4.2	Low Emitting Materials: Paints & Coatings	Pref		
EQ4.3	Low Emitting Materials: Carpet Systems	Pref		
EQ4.4	Low Emitting Materials: Composite Wood & Agrifiber Products	Pref		
EQ5	Indoor Chemical & Pollutant Source Control	Pref		System requiring weekly cleaning to earn this credit is not a permitted option for Army projects.
EQ6.1	Controllability of Systems: Lighting			
EQ6.2	Controllability of Systems: Thermal Comfort			
EQ7.1	Thermal Comfort: Design			
EQ7.2	Thermal Comfort: Verification			Project must earn credit EQ7.1 to be eligible for this credit. Assume Government will not provide post-occupancy activities unless indicated otherwise.
EQ8.1	Daylight & Views: Daylight 75% of Spaces	Pref		
EQ8.2	Daylight & Views: Views for 90% of Spaces	Pref		
<u>CATEGORY 6 – FACILITY DELIVERY PROCESS (5 POSSIBLE POINTS)</u>				
IDc1.1	Innovation in Design			
IDc1.2	Innovation in Design			
IDc1.3	Innovation in Design			
IDc1.4	Innovation in Design			
IDc2	LEED Accredited Professional	Rqd	Rqd	LEED AP during design and construction is required.

Resources. Following are resources with web links, discussion of Federal and Army mandates and policies that relate to LEED, sources of design guidance and documentation tools to assist the PDT. Use of/compliance with documents indicated in this appendix is not required unless indicated in RFP. In the event of conflict between RFP and this appendix, RFP takes precedence.

Federal Mandates

EPA, *Environmentally Preferable Purchasing (EPP) Program* (EPA), available through URL: <http://www.epa.gov/oppt/epp/>. Resulting from Executive Order [EO] 13101 *Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition* (White House, 14 September 1998), it establishes basic guidelines for EPP as well as forms the basis for Comprehensive Procurement Guidelines (see below).

Comprehensive Procurement Guidelines [CPG], www.epa.gov/cpg.

The EPA publishes the Comprehensive Procurement Guidelines (CPGs), found in 40 CFR 247, that provide a list of products that must contain recovered material. **This is required regardless of whether the LEED recycled content credit is pursued or not.** Recommendations for the percentages of recovered materials are published in a companion document titled the Recovered Materials Advisory Notice (RMAN). Additional products are added every 2-3 years. The CPGs currently include several commonly used construction products (such as concrete, floor tiles, and roofing materials) and landscaping products (such as site furnishings and landscaping timbers).

EPA requires that the purchase of products listed on the CPG contain at least the recycled content indicated in the CPG when practicable. For every project, designer must review the current CPG list and, unless designer determines that justification for non-use exists, ensure that the technical specifications require at least the recycled content indicated in the CPG. The following are considered adequate justifications for non-use:

- a. The product does not meet appropriate performance standards.
- b. The product is not available within a reasonable time frame.
- c. The product is not available competitively (from two or more sources).
- d. The product is only available at an unreasonable price (compared with a comparable non-recycled content product).

Applicable FAR provisions and clauses: FAR Part 23.4, *Use of Recovered Materials*, 52.223-4, *Recovered Material Certification*, 52.223-9, *Estimate of Percentage of Recovered Material Content for EPA-Designated Products*. Note that although EPA designated recycled content products contribute to the LEED recycled content credit, satisfying this requirement does not guarantee that the project will reach the cumulative total required to earn the LEED credit.

USDA Federal Biobased Products Preferred Procurement Program (FB4P)

<http://www.biobased.oce.usda.gov>

The USDA has a program similar to the EPA CPG, found in 7 CFR 2902, that provides a list of designated products that must contain bio-based material with recommendations for the percentages of bio-based content. The rules for use of designated products are the same as EPA CPG. Currently the only designated construction product is roof coatings, however additional products may be added. For every project, designer must review the current USDA designations for products applicable to the project and, if any are found, unless designer determines that justification for non-use exists, ensure that the technical specifications require at least the bio-based content indicated in the designation.

All Federal contracts that involve the use or purchase of USDA- designated products must specify that the associated procurement requirements be met and must include applicable FAR provisions and clauses (currently not yet published). Note that although USDA designated bio-based content products contribute to the LEED rapidly renewable materials credit, satisfying this requirement does not guarantee that the project will reach the cumulative total required to earn the LEED credit.

Army Policy and Mandates

ECB 2006-7R Army Standard for Urinals (09 AUG2006) www.hnd.usace.army.mil/techinfo "Publications", "Engineering and Construction Bulletins". Mandates waterless urinals beginning FY10.

United States Green Building Council/LEED

USGBC Website – <http://www.usgbc.org>

LEED-NC (New Construction) v.2.2 Rating System, October 2005 --
<https://www.usgbc.org/ShowFile.aspx?DocumentID=1095>

LEED-NC v.2.2 Registered Project Checklist --
https://www.usgbc.org/FileHandling/show_general_file.asp?DocumentID=1096

LEED-NC v.2.2 Reference Guide – Available by purchase from the USGBC at:
<http://www.usgbc.org/b2c/b2c/mainFS.jsp>

LEED Letter Templates – Use of LEED Letter Templates for projects not registered with USGBC is a copyright infringement and is not permitted. Samples of the templates are available for review only at: <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1447>. (Fully functional access to LEED On-Line is only available to projects registered with the USGBC.)

LEED Credit Interpretations (CIRs) – Available on the members only side of the USGBC website. Click 'My Account' from the USGBC main web page (log-in and look for CIRs under 'My Resources.'

LEED Application Guide for Multiple Buildings and On-Campus Building Projects
https://www.usgbc.org/FileHandling/show_general_file.asp?DocumentID=1097. Provides direction in applying LEED-NC v2.1 and v2.2 to projects in a campus or multi-building setting such as corporate campuses, college campuses, and government installations (i.e. there is one owner or common property management and control).

General Resources

Unified Facilities Guide Specifications (UFGS) www.wbdg.org/ccb

UFGS are non-proprietary guide specifications covering a broad range of products and systems and incorporating agency-specific guidance and many sustainability updates. They are used and maintained by USACE, NAVFAC, AFCEA and NASA.

UFGS are in the process of being updated to include Specifier notes relating to all current EPA CPG product designations, but this process is not complete yet. Designer MUST address EPA CPG requirements in specifications on a product-by-product basis.

UFGS 01 33 29 *LEED™ Documentation*. This section includes overview and documentation requirements plus credit-specific requirements.

UFGS 01 62 35 *Recycled/Recovered Materials*. This section addresses EPA CPG compliance requirements.

UFGS 02 42 00 *Construction and Demolition Waste Management*. For DB and DBB use. This section includes requirement for waste management plan, diversion requirements and reporting.

UFGS 23 08 00.00 10 *Commissioning of HVAC Systems*. This section includes qualifications, standards and documentation, also includes several test checklists. Because it is limited to HVAC only it **does not** by itself satisfy the LEED fundamental commissioning requirement. Commissioning of other LEED required systems and coordination of documentation associated with this additional commissioning must be addressed.

USACE LEED Credit Documentation Tools

LEED 2.2 Documentation Requirements and Submittals Checklist. USACE Spreadsheet is available at <http://en.sas.usace.army.mil> to fill in for project submittals.

Commissioning Plan Document for LEED Fundamental Commissioning USACE template available at <http://en.sas.usace.army.mil> to edit to create project-specific document.

Owners Project Requirements Document for LEED Fundamental Commissioning. USACE template available at <http://en.sas.usace.army.mil> for Design Agent/Owner to edit to create project-specific document. Completed document should be included in DB RFPs or provided to Design Team at start of design.

Basis of Design Document for LEED Fundamental Commissioning. USACE template available at <http://en.sas.usace.army.mil> for Designer of Record to edit to create project-specific document.

APPENDIX M

LEED OWNER'S PROJECT REQUIREMENTS



LEED-NC

LEED-NC Version 2.2 Registered Project Checklist

USACE Southwest Region

Fort Bliss Expansion Project

Project: **PN 057434 Indoor Aquatics Center**

Yes D/B	Yes GOV	? D/B	? GOV	No		
2	6	1	1	4	Sustainable Sites	14 Points

Y					Prereq 1	Construction Activity Pollution Prevention	Required
	1				Credit 1	Site Selection	1
				1	Credit 2	Development Density & Community Connectivity	1
				1	Credit 3	Brownfield Redevelopment	1
		1			Credit 4.1	Alternative Transportation, Public Transportation Access	1
1					Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
	1				Credit 4.3	Alternative Transportation, Low-Emitting and Fuel-Efficient Vehicles (see Note 1)	1
			1		Credit 4.4	Alternative Transportation, Parking Capacity (see Note 1)	1
				1	Credit 5.1	Site Development, Protect or Restore Habitat	1
	1				Credit 5.2	Site Development, Maximize Open Space (See Note 2)	1
	1				Credit 6.1	Stormwater Design, Quantity Control (see Note 2)	1
	1				Credit 6.2	Stormwater Design, Quality Control (see Note 2)	1
	1				Credit 7.1	Heat Island Effect, Non-Roof (see Note 2)	1
1					Credit 7.2	Heat Island Effect, Roof	1
				1	Credit 8	Light Pollution Reduction	1

Yes D/B	Yes GOV	? D/B	? GOV	No		
2	1				Water Efficiency	5 Points

	1				Credit 1.1	Water Efficient Landscaping, Reduce by 50% (see Note 2)	1
					Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
					Credit 2	Innovative Wastewater Technologies	1
1					Credit 3.1	Water Use Reduction, 20% Reduction	1
1					Credit 3.2	Water Use Reduction, 30% Reduction	1

Yes D/B	Yes GOV	? D/B	? GOV	No		
3		8		2	Energy & Atmosphere	17 Points

Y					Prereq 1	Fundamental Commissioning of the Building Energy Systems	Required
Y					Prereq 2	Minimum Energy Performance	Required
Y					Prereq 3	Fundamental Refrigerant Management	Required
2		8			Credit 1	Optimize Energy Performance	1 to 10
					Credit 2	On-Site Renewable Energy	1 to 3
1					Credit 3	Enhanced Commissioning	1
					Credit 4	Enhanced Refrigerant Management	1
				1	Credit 5	Measurement & Verification	1
				1	Credit 6	Green Power	1

Notes:

1. SS Credit 4.3.4.4: - DB Contractor is to install signage to designate parking for fuel-efficient vehicles as shown on site design.
2. SS Credit 5.2, 6.1, 6.2, 7.1, and WE Credit 1.1 - DB Contractor is to construct site based on design supplied in RFP.
3. Achievement of MR Credit 2.1 is required by RFP Section 01 10 00.5.12.
4. Achievement of MR Credit 4.1 is required by RFP Section 01 10 00.5.11.8.

22 Jul 10 - APPENDIX M

NATATORIUMS

Owner's Project Requirements (OPR) Document for LEED Fundamental Commissioning

Purpose: *The general purpose of this document is to provide clear and concise documentation of the Owner's goals, expectations and requirements for commissioned systems, and further this document shall be utilized throughout the project delivery and commissioning process to provide an informed baseline and focus for design development and for validating systems' energy and environmental performance. The Owner's Project Requirements Document is a required document for purposes of LEED - Fundamental Commissioning of the Building Energy Systems. This document is to be used conjunctively with the RFP. However in areas where this APPENDIX M document presents ambiguity or conflicts with regards to the RFP – RFP shall govern and it recommend that the Geographic District provide the statement: "Refer to RFP" as appropriate.*

Project Title/ Project Number: _____

Disclaimer: *While assistance with APPENDIX M has been provided by the COS – This document shall be reviewed and completed by the Geographic District and approved and coordinated with Base Installation/End User or Proponent as applicable to this project. Use of this template is not required, nor are there any restrictions on editing of it. It is provided simply as a tool to assist project teams in meeting the documentation requirements for LEED Fundamental Commissioning. "Plug-n-Go" format - HNC has designed this template to be plug and go format leaving the GD the responsibility of only filling in the Project name and number and signing off on the document. All the responses have been pre-filled in – GD/ Owner therefore reserves the right to make changes to this document as it sees fit.*

-Signatures -

Completed by:

Geographic Corps District – Project Manager

Date

Approved by:

Installation/End User/ Proponent

Date

General Note to Project Managers: *The Owner's Project Requirements Document should ideally be completed before the start of design and then furnished to the design team. It must be completed prior to the approval of Contractor submittals of any commissioned equipment or systems to meet LEED requirements. PMs are required to maintain this Owner's Project Requirements Document in the project's LEED documentation file under - Fundamental Commissioning of the Building Energy Systems.*

22 Jul 10 - APPENDIX M

NATATORIUMS

Instructions: *The Geographic District (GD) shall review and reply to all questions in each category as applicable and/or provide the statement: “None identified”, “N/A” - Or- “Refer to RFP” as it relates to the project. “Plug-n-Go” format - HNC has designed this template in a “plug and go” format leaving the GD the responsibility of only filling in the Project name and number and signing off on the document. All the responses have been pre-filled in – GD/ Owner therefore reserves the right to make changes to this document as it sees fit.*

1. Owner and User Requirements and Broad Goals.

1.1 Briefly describe the primary purpose, and use of this project. Also indicate any broad goals relative to program needs and future expansion (Example: office building with data center needs to flexible enough to accommodate soldiers during deployment and emergency situations)

The primary purpose is a natatorium building which is used to facilitate physical activity of both soldiers and their families and the military community.

1.2 Briefly describe broad goals relative to quality of materials, construction cost, operational cost and life cycle of equipment.

Please “Refer to RFP” for necessary requirements for quality of material, construction cost, operational cost and life cycle on equipment.

2. Environmental and Sustainability Goals.

2.1 Briefly describe the project goals relative to sustainability, environmental issues and energy efficiency. (Example: LEED Silver rating; Meet EPACT)

The project is expected at minimum to meet the requirements for a LEED – Silver Rating. In addition the project must meet all necessary energy requirements for provisions of EPACT.

2.2 Briefly describe the project goals relative to building envelope and elements that will impact energy use. (Example: building orientation; facade of the building; fenestration requirements; roofing materials)

Recommend the building be oriented for best day lighting and energy performance. Ensure moisture and water control measures are properly installed. Ensure all project goals are listed in Division -1 of specifications as to identify performance expectations. Ensure glazing and skylight openings are properly flashed and sealed. Ensure insulation R-values meet the minimum requirements. Ensure air leakage controls are implemented; test such as the blow door testing or infrared photos are encouraged in effort to examine joint sealant and other potential leaks.

22 Jul 10 - APPENDIX M

NATATORIUMS**3. Indoor Environmental Quality Requirements and the Equipment and System Expectations.**

3.1 As applicable to this project briefly describe any accommodations necessary for after hours use and or equipment and system expectations. (Example: access control, lighting controls, daylighting controls, HVAC controls, domestic hot water, energy power)

Ensure the lighting fixture type, number, location; desired light level controls and switching are consistent with the construction documents intent. Ensure the thermal controls and functions properly and spaces are comfortable, confirm that the efficiency of HVAC equipment, control functions and sensor locations are consistent with construction documents as well.

3.2 Briefly describe the lighting, temperature, humidity, air quality, and ventilation and filtration requirements relative to indoor environmental quality.

Must meet or exceed the provisions of ASHRAE 62 for air quality, ventilation and filtration.

4. Building Occupant and O&M Personnel Requirements.

4.1 Indicate if the facility be connected to an EMCS. If so, what are the interface requirements? (example: monitoring points, control points, scheduling)

Recommend "Refer to RFP" for all necessary interface requirements.

4.2 Briefly describe the desired level of training and orientation for building occupants and O&M staff to understand and use the building systems.

Provide a user manual for occupants who explain at minimum: how energy efficient building system works, how to make minor adjustments and also provide in case of emergency information on who to contact for problems. Also include occupant training on complex systems. After one year of construction should conduct an evaluation which addresses energy use, utility cost, water use and also addresses occupant comments and concerns and financial performance.

22 Jul 10 - APPENDIX M

NATATORIUMS**Table 1: Room Function and Requirements.***Directions: Briefly describe expectations for each of the room spaces in the building.*

Type of Space	Use / Activity	Estimated Number of Occupants
CLASSROOMS	Used for instructional purposes; Assembly and large gatherings.	Note: Occupant size will vary with regard to facility size – Refer to Standard Design.
OFFICES	Used for administrative office functions; computer use.	See Note above.
KITCHEN/ BREAK AREAS	Used for purposes of heating and reheating food/ meeting area / dinning area.	See Note above.
LOBBY	Used as a sitting waiting area.	See Note above.
CONFERENCE ROOMS	Used for small gatherings and private meetings.	See Note above.
MECH/ELECT/ COMM RM	Used to facilities building service areas.	See Note above.
STORAGE AREA	Used to house non-hazardous, administrative office equipment and supplies.	See Note above.

Expected to meet all criteria and design requirements in both the RFP and Standard design.

******* THIS MARKS THE END OF THIS DOCUMENT.**

APPENDIX N

LEED REQUIREMENTS FOR MULTIPLE CONTRACTOR COMBINED PROJECTS

NOT USED

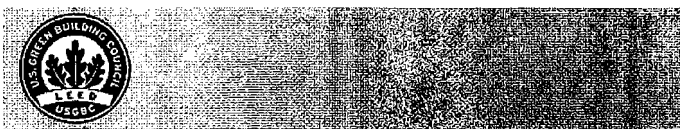
APPENDIX O

LEED STRATEGY TABLES

NOT USED

APPENDIX P

USGBC REGISTRATION

WELCOME TAMMY
Bliss -Indoor Aquatic Training Fac 57434 (LEED NC
2.2)

LEED-Online Home Credit Scorecard & Status Project Summary Team Admin Documents CIR Detail Help Project Selector Sign Out

PROJECT SUMMARY

REGISTRATION

Registration	Design Application	Design Review	Design Appeal	Design Appeal Review	Construction Application	Construction Review	Construction Appeal	Construction Appeal Review	Certification /Denial
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PROJECT SUMMARY

You have 0 new Notification.



Click on "Edit" at the bottom of the page to update or add any information.

Note: All fields are required. You must provide an answer to all questions to update your information.

Summary	Project Address	Certification	Primary Contact	Project Manager	Owner	Architect	Project Type	Documents
BASICS								
Project Name (40 character limit):		Bliss -Indoor Aquatic Training Fac 57434		Owner Type:		Federal Government		
Project Access ID:		3693527702163353		Will Owner Occupy Completed Project:		Yes		
How Did You Hear About LEED?		Other		Occupant Type:		Federal Government		
Is Project Confidential? (Confidential Projects are not listed on Web Site)		No		Estimated Date of Occupancy:		3/1/2012		
				Current Project Phase:		Design Development		
PROJECT COST								
Project cost not including site work, furniture, fit-out and equipment (FFE):		16500000		% New construction:		0		
Estimated furniture, fit-out and equipment (FFE) budget:		0		% Renovation:		0		
Estimated site work budget, including surface parking:		0		Located in Historic District:		No		
Estimated first cost/savings with green/sustainable technologies, strategies and design:		0		Year original (or new) building constructed:		2011		
Estimated 20 year life cycle savings through green/sustainable technologies, strategies and design:		0		Project Scope:		Single Building		
Estimated cost to prepare documentation for LEED Certification:		0		Hours/week building is in use/occupied:		0		
Note: Numbers only please. Please omit dollar signs, commas, and decimals. (ex. Correct: 100000 Incorrect: \$100,000.00)								
PROJECT SITE								
Total Property Area: (in Square Feet)		0		Floors Above Ground Plane:		0		
Gross Square Footage: (in Square Feet)		64010		Construction Classification Code:		-		
Total Building Footprint: (in Square Feet)		0		Occupancy Classification Code:		-		
Surface parking spaces:		0		Project Building Code:		-		
Structure Parking Spaces:		0		Building Occupants:		0		
Undisturbed Site Area:		0						
Site Context/Setting:		Suburban						
Site Conditions:		Previously Undeveloped						
PROJECT BUILDING CODE								

APPENDIX Q
REV 2.1 – 30 SEP 2010
AREA COMPUTATIONS

Computation of Areas: Compute the “gross area” and “net area” of facilities (excluding family housing) in accordance with the following subparagraphs:

(1) Enclosed Spaces: The “gross area” is the sum of all floor spaces with an average clear height $\geq 6'-11"$ (as measured to the underside of the structural system) and having perimeter walls which are $\geq 4'-11"$. The area is calculated by measuring to the exterior dimensions of surfaces and walls.

(2) Half-Scope Spaces: Areas of the following spaces shall count as one-half scope when calculating “gross area”:

- Balconies
- Porches
- Covered exterior loading platforms or facilities
- **Covered but not enclosed spaces, canopies, training, and assembly areas**
- Covered but not enclosed passageways and walks
- Open stairways (both covered and uncovered)
- Covered ramps
- Interior corridors (Unaccompanied Enlisted Personnel Housing Only)

(3) Excluded Spaces: The following spaces shall be excluded from the “gross area” calculation:

- Crawl spaces
- Uncovered exterior loading platforms or facilities
- Exterior insulation applied to existing buildings
- Open courtyards
- Open paved terraces
- Uncovered ramps
- Uncovered stoops
- Utility tunnels and raceways
- Roof overhangs and soffits measuring less than 3'-0" from the exterior face of the building to the fascia

(4) Net Floor Area: Where required, “net area” is calculated by measuring the inside clear dimensions from the finish surfaces of walls. If required, overall “assignable net area” is determined by subtracting the following spaces from the “gross area”:

- Basements not suited as office, special mechanical, or storage space
- Elevator shafts and machinery space
- Exterior walls
- Interior partitions
- Mechanical equipment and water supply equipment space
- Permanent corridors and hallways
- Stairs and stair towers
- Janitor closets
- Electrical equipment space
- Electronic/communications equipment space

APPENDIX R

Preliminary Submittal Register

NOTE TO SPECIFIER:

1. Appendix R" will be a Adobe Acrobat pdf version of the Specifier completed "Sample Preliminary Submittal Register." The Sample Register is Excel Spreadsheet format of the RMS Input Form 4288A, which serves two purposes.
2. First, The Register allows the both Government and the Proposers to see and estimate the cost of the Division 00 and Division 01 submittals required by the contract in addition to the Contractor generated submittal register items developed during Design After Award.
3. Secondly, after award, the Government will provide the Contractor the actual Excel Spreadsheet for the Contractor to input the data into RMS to create the Submittal Register used during contract performance. See Section 01 33 00 (Submittal Procedures), paragraph 1.8 (Submittal Register) for the contract requirements.
4. For the contract or task order Solicitation, the Specifier must complete APPENDIX R, found at the following link:
<http://rfpwizard.cecer.army.mil/HTML/Docs/Refs/Sample%20Preliminary%20Submittal%20Register.xls> , save it as a PDF file and then upload it into the Wizard as Appendix R.
5. The RMS Input Form initially includes submittals required by the standardized Model RFP Division 00 and Division 01 Sections, except Section 01 10 00, paragraph 3. Examine the Special Contract Requirements, paragraphs 3 and 6 and any other locally developed portions of the RFP for required submittals and add them to the Input Form. Do not duplicate submittals already listed in the standardized RMS Input Form, because the Contractor needs to submit this information only once.
6. After award, the Government provides the Excel spreadsheet to the selected contractor to develop and input the RMS Input form for the submittal register required by paragraph 1.8 of Section 01 33 00, Submittals.

APPENDIX AA

FORT BLISS IDG EXCERPTS

Update
2/19/2009

4.1.3 Environmental Setting

The arid southwest ecoregion is comprised of essentially two provinces, the Chihuahuan Desert Province and the American Semi-desert and Desert Province (Fig. 4.4). Both provinces share similar climatic conditions of extreme aridity as well as extremely high air and soil temperatures, which are characteristics of tropical/subtropical deserts. Direct sun radiation is strong, as is outgoing radiation at night, causing extreme variations between night and day temperatures (35–45° F), and rare nocturnal frosts. Annual precipitation is typically less than 9 inches and vegetation is xeriphytic, widely dispersed and providing negligible groundcover. Many annual species are present but only appear with heavy rains that saturate the soil. The dominant soil formation process is salinization, which produces areas of salt crust. Calcification also occurs in well-drained uplands and forms caliche (calcium carbonate) layers at soil depths of at least 12 inches below the surface. Humus in the soil is lacking (except along riparian areas) and soils are mostly Aridisols (soils formed in very dry conditions) and dry Entisols (recently developed soils).

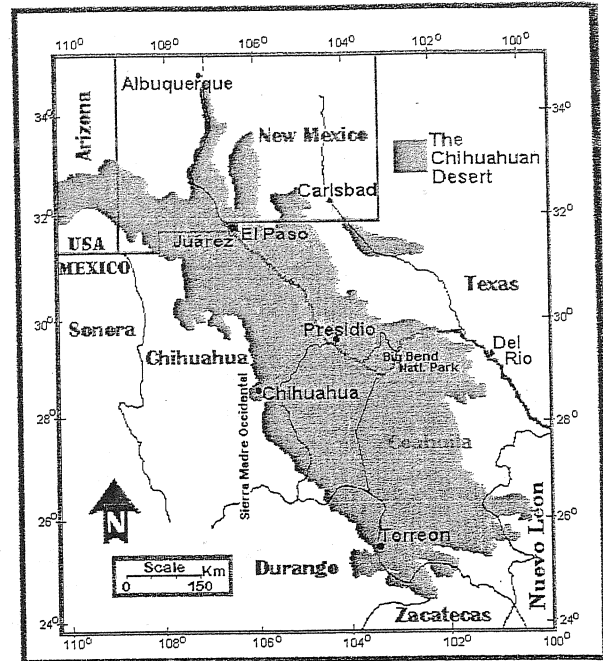


Fig. 4.4 - Chihuahuan Desert (map from UTEP website)

4.1.3.1 Topography

Fort Bliss is located partially within the Chihuahuan Desert Province and the American Semi-desert and Desert Province of the southwest region of the United States. The Chihuahuan Desert consists of southeastern Arizona, southern New Mexico and western Texas, encompassing approximately 85,200 square miles. The high desert consists of undulating plains, elevations near 4,000 feet and isolated mountains rising 2,000 to 5,000 feet. The American Semi-desert and Desert Province consists of southwestern California, southwestern Arizona, and southern Nevada and includes the Mojave, Colorado, and Sonoran deserts. (87,700 sq. mi.) The topography is characterized by gently undulating plains, isolated mountains, and buttes. Elevations range from 280 feet below sea level to 4,000 feet in valleys and basins. Some mountain ranges reach as high as 11,000 feet. Most of the province drains to the sea via dry washes or through underground seepage. The Colorado River is the largest and principal river through the province.

4.1.3.2 Geology

The Rio Grande Drainage Basin's geologic history generally ranges from Precambrian to late Cretaceous. During this time, the area experienced folding, broad regional uplifting, and inundations by continental seas. The current topography in the area reflects Cenozoic structural deformation.

Update
2/19/2009

Fault patterns in the area indicate that extension in the southwestern United States was the result of both broad regional uplift and differential drift within the North American Plate. These forces combined to form a physiographic province characterized by dropped basins (called grabens) bounded by tilted fault block ridges (called horsts). More simply stated, grabens and horsts are formed when rock layers move upward along a fault line creating a ridge (horsts) and/or rock layers subside along a fault line creating a basin (graben). A structural trough was created by mid-Tertiary high-angle extension faults running north south in front of the Franklin Mountains (Fig. 4.5). This represents both the approximate combined throw along two identified fault planes and the subsequent thickest Hueco bolson unconsolidated fill deposits.

Minor faulting continues in the area affecting Pleistocene and early Holocene bolson deposits. Evidence of the faulting is seen in the fault-scarp of the alluvial fan (created by sediments carried down from the mountains in a fan shape) that parallels the bedrock front of the Franklin Mountains. Movement along this fault was normal, with the basinward blocks subsiding approximately 200-300 feet relative to the mountain front. Smaller displacement faults (trending north-south) extend eastward across the Hueco bolson. These faults cut bolson deposits, Holocene alluviums, Pleistocene gravels, and the subsurface caliche layer. These Quaternary faults may uplift/basin-subsidence episodes. The proximity of the area to the eastern edge of the Rio Grande Rift Zone accounts for the extensive presence of various volcanic dikes and sills that crosscut existing structures.

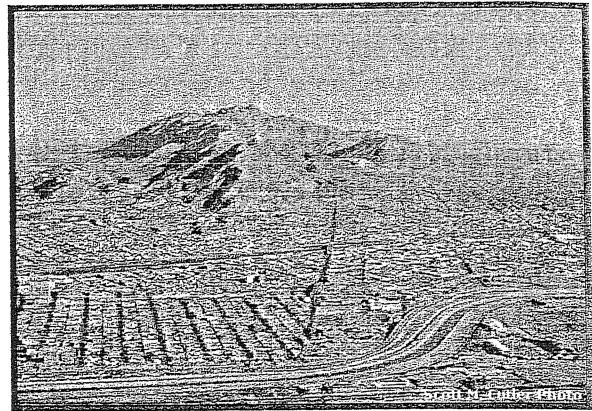


Fig. 4.5 - Franklin Mountains

4.1.3.3 Soils

Soils are mostly aridisols in the western and northern portions of the province. Entisols and aridisols are found in the southern areas of the province. Alkaline conditions are present and salt crusting at the surface and caliche below the surface are typical. Soils are shallow and well drained, and gravelly or sandy in texture. Primary soil type is aridisols but entisols occur on older alluvial fans and terraces. Gravel or bare rock covers much of the ground near the bases of some mountains due to strong desert rainstorms that allow little soil development to occur.

4.1.3.4 Climate

Climate within the Chihuahuan Desert is distinctly arid with long hot summers, brief cold winters and occasional hard freezes (mean temp. 10-20°F). There are approximately 230-245 frost-free days but freezes are common and can last up to 72 hours. Spring and early summer are extremely dry; three quarters of the rainfall comes in summer monsoons, the rest as gentle rains in winter. Eight inches of rain falls in the desert and up to 20 inches in the mountains. Severe droughts occur about every 20 years have been recorded since 1890's.

Update
February 2009

7.5.3.1 Hot Arid Regions. Design and site development to minimize solar heat gain and maximize shade and encourage humidity in outdoor spaces (Fig. 7.5).

7.5.4 Views and Vistas. The installation will be designed to preserve and enhance scenic and other attractive views and vistas, and to screen unattractive views and vistas. Visual extensions through open spaces provide a sense of orientation, relief, and enjoyment.

7.5.5 Vegetation. The installation will be designed to protect and preserve existing native vegetation. This preservation reduces maintenance and enhances sustainability. A preferred plant matrix (Appendix O, Plant Palette) is included in this Installation Design Guide. (Also, see Section 10 – Landscape Design Component).

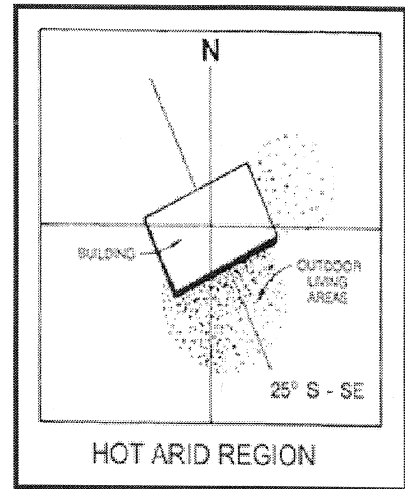


Fig. 7.5 – Building Orientation Minimizes Solar Heat Gain

7.6 MANMADE SITE CONDITIONS

7.6.1 The site plan provides the locations of the manmade development that will occur on site. It establishes the spatial relationships as well as the relationships between manmade and existing natural features. Manmade site conditions include all development on the installation to include buildings, roadways, parking lots, walkways, walls, fences, utilities, and other facilities. Buildings, roadways, parking lots and above ground utilities are the primary manmade visual determinants.

7.6.2 The following site planning guidelines will be used in the visual and spatial review of the installation:

7.6.2.1 Cluster buildings to reduce impact on the natural environment, and reduce roadways and utility corridors needed to serve the development; at the same time, give full consideration to antiterrorism and force protection requirements.

7.6.2.2 Locate large buildings in relatively flat areas to reduce cut and fill, preserve natural vegetation and drainage, and orient to topography (Fig. 7.6).

7.6.2.3 Minimize solar heat gain for cooling.

7.6.2.4 Site buildings with consideration for the microclimate conditions of the site that result in variances in wind or light because of adjacent land forms, structures, or trees.

7.6.2.5 Orient outdoor pedestrian areas for most comfortable exposure.

7.6.2.6 Utilize lighter colored building surfaces exposed to the sun and darker colors on recessed surfaces to absorb radiation.

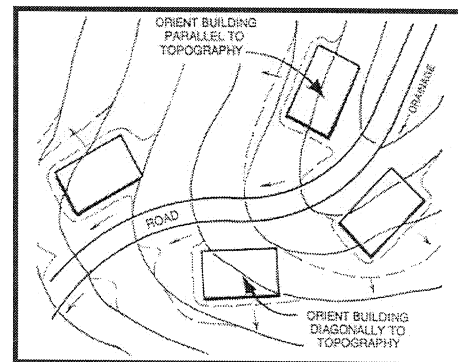


Fig. 7.6 - Orient Buildings and Roads to Topography

Update
February 2009

- 7.6.2.7 Orient windows according to impact of climatic conditions.
- 7.6.2.8 Locate development on leeward side of hills.
- 7.6.2.9 Design and locate roads to provide a hierarchy of traffic carrying capacities.
- 7.6.2.10 Locate roads to blend with topography and vegetation.
- 7.6.2.11 Design and locate parking lots to minimize visual impact of broad expanses of pavement and vehicles.
- 7.6.2.12 Design and locate pedestrian walkways and bicycle paths to fit the physical environment; and, provide a comfortable pedestrian experience, limiting conflicts with vehicular traffic.
- 7.6.2.13 Locate trees and shrubs to buffer harsh natural conditions (Fig. 7.7).
- 7.6.2.14 Deciduous material allows for sun in the winter and provides shade in the summer. Evergreen material provides windbreaks for cold north winds.
- 7.6.2.15 Design and locate site elements to blend with and enhance the physical environmental.
- 7.6.2.16 Force Protection requirements should be designed and located to blend with the physical environment.

7.7 SPECIFIC SITE PLANNING CONSIDERATIONS

7.7.1 Site planning considerations must adhere to the physical historic context, or setting, of a historic district. The setting of a historic district is the area or environment in which a historic property is found. The elements of setting, such as the relationship of buildings to each other, setbacks, views, driveways and walkways, and street trees collectively create the character of a district. In instances, such as at Fort Bliss, buildings themselves form a neighborhood or setting that create the character of the district.

New site planning and new construction in Fort Bliss historic districts or in a historic district's view shed shall be physically compatible with the visual and spatial character of the historic district. Site planning considerations shall take into account the historical planning of the installation. This includes: location and orientation of buildings, spaces between

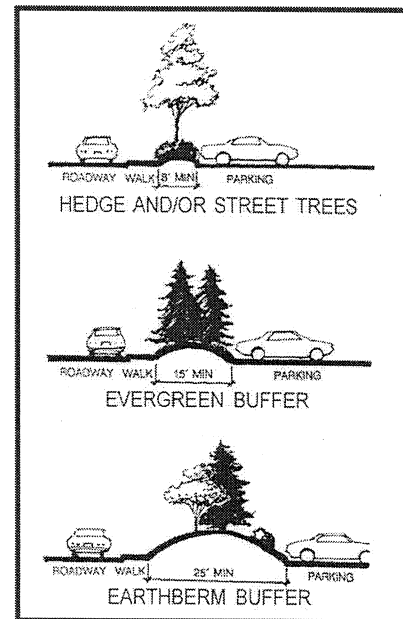


Fig. 7.7 - Screen Parking Areas

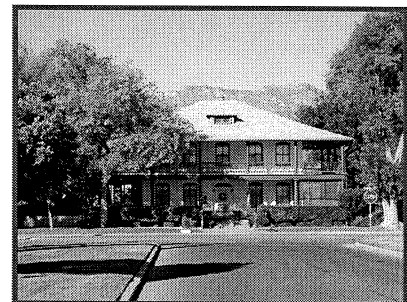


Fig. 7.8 - Pershing House – Historic District

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SECTION 8 BUILDINGS DESIGN STANDARDS

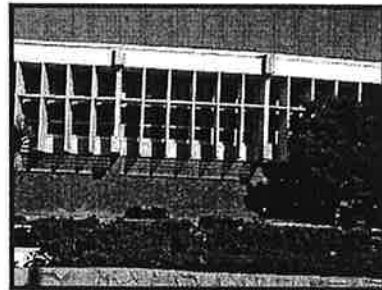
8.1 INTRODUCTION

8.1.1 The design character of an installation's buildings affects the installation's overall image. The visual analysis of buildings and related structures helps define visual zones and themes and is an important part of an installation's assets and liabilities assessment.

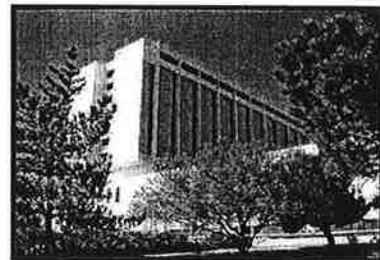
8.1.2 The building design component encompasses the character of the buildings as well as the arrangement of buildings relative to one another and to their environment. In general, use architectural style, materials, and colors indigenous to the region. The preservation of historically and culturally significant structures adds to an installation's character and provides the sense of a heritage.

8.1.3 The visual analysis of structures also includes concerns for accessibility, use of materials, placement of entrances, incorporation of additions and renovations, the incorporation of plazas and courtyards, interior design and the appropriateness and quality of building maintenance.

8.1.4 This section provides the objectives and visual determinants that should be utilized to identify and assess the building design quality of the installation. The section also provides standards and guidance pertaining to the development and maintenance of the various interiors and exteriors of buildings on the installation.



**Fig. 8.1 – Architectural Detail
of USASMA Building**



**Fig. 8.2 – The Medical Center
Main Building**

8.2 BUILDING OBJECTIVES

8.2.1 Sustainability. The architectural style of existing and future buildings should reflect and reinforce the sustainability of the installation. Sustainable design reduces construction and maintenance cost and conserves energy through proper construction and materials selection. See [Appendix D](#) for a

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more complete discussion on Sustainable Design.

8.2.2 Building Design Objectives:

8.2.2.1 Adapt building designs to natural site conditions (Fig. 8.3).

8.2.2.2 Design buildings in clusters to preserve land and reduce construction and maintenance costs.

8.2.2.3 Develop a coherent architectural style that results in the blending of new and old structures. However, when considering historical buildings, one should be able to differentiate between the historic fabric and the new material.

8.2.2.4 Design buildings to include more floors in a vertical structure that results in a smaller footprint and more efficiently utilizes limited installation land areas.

8.2.2.5 Combine multiple activities in one building to reduce the number of buildings required and more efficiently utilize limited installation land areas.

8.2.2.6 Design multiple use facilities with the capability to quickly change interior layouts to accommodate changing requirements.

8.2.2.7 Use indigenous construction materials and practices that require less energy to produce and transport and may be recycled at the end of their usefulness.

8.2.2.8 Locate windows to maximize natural light, ventilation and outward views.

- a) All windows and other glazed areas exposed to the sun, including all glass within 20 degrees east or west of true south, shall be completely shaded on the exterior no less than 50 percent of the time between 0900 and 1730 (solar time) daily during the period from 30 April through 1 October. Partial shading all the time is an acceptable alternative provided the total solar gain does not exceed the amount permitted above, based on actual solar studies. Shading may be achieved by building projections (either horizontal or vertical), by a deep reveal, or any combination of these measures or other architectural design.
- b) True South: Magnetic declination for Fort Bliss is 12 degrees east; that is, a compass reads 12 degrees east of True North or 12 degrees west of True South.
- c) Optimum Direct Gain Aperture Range (percent range of glazed opening to floor area): 11.6 percent.
- d) Minimum profile angle for fixed shade design (may declination): 65.5 degrees.
- e) Recommended shade devices (East and West): Trees and shrubs.

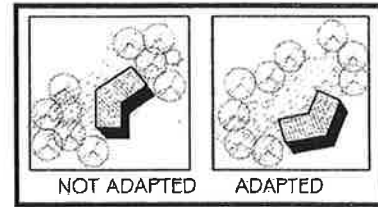


Fig. 8.3 - Adapt Building Design To Site Conditions

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- f) Optimum orientation of facility for passive solar and topo conditions: Within 20 degrees east or west of True South.

8.2.2.9 Consider adaptive reuse of buildings once their initial use is no longer required.

8.3 STRUCTURAL CHARACTER

8.3.1 The character of installation architecture varies according to the use of the structure and when it was built. This use and age variation can result in character incompatibilities.

8.3.2 The difference in character may also result when the designer ignores the character and scale of adjacent buildings or uses an imitative technique unsuccessfully.

8.3.3 The coordination of structural character on an installation provides a consistent and coherent “sense of order” and “sense of place”. This relationship of design comes from using compatible scales, massing, form, color, texture, materials, and fenestration. These design techniques can be utilized in the visual review and analysis of the installation. They are further explained below:

8.3.3.1 Scale. Scale refers to the size of a building facade in relation to humans. Buildings that include predominant vertical facades, which dwarf the individual, are defined as monumental in scale. Buildings with more horizontal facades designed to relate more to the size of the human figure are defined as human scale (Fig. 8.4). The scale of most buildings on installations should be more human than monumental. All new construction should be compatible in scale with adjacent buildings. Monumental architectural design is typically utilized for more ceremonial buildings, such as worship centers, headquarters complexes, and hotel facilities. These buildings make use of large, glazed areas at entrances and oversized fenestration elements to create a scale appropriate to the building’s use. Scale and relief should be provided through roof form, fenestration, building articulation and landscape plantings.

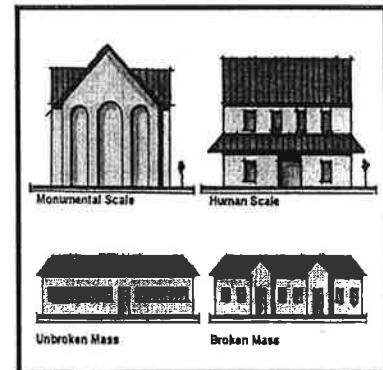


Fig. 8.4 - Structure Scale and Massing

8.3.3.2 Massing. Massing refers to the overall bulk or volume of a building or buildings (Fig. 8.4). The size and proportion of the individual buildings in a grouping of buildings should be designed to be proportionally compatible with the adjacent structures.

8.3.3.3 Form. The form of a building is determined by its size, mass, shape and proportions. The use of similar building forms provides continuity to the installation architectural image.

8.3.3.4 Color. The use of a color scheme that is consistent throughout the installation, where possible, results in a continuity of buildings and contributes to a sense of place



Fig. 8.5 - Color and Form Contribute to a Sense of Place.

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(Fig. 8.5). However, color schemes throughout the installation often vary according to the visual zone and visual theme in which the structure is located.

8.3.3.5 Texture. The use of building materials of similar texture provides visual continuity for the installation.

8.3.3.6 Materials. The use of similar building exterior finish and trim materials provides visual continuity.

8.3.3.7 Fenestration. Building fenestration includes features such as doors, windows, and decorative details. These features should be similar in arrangement, design, size, and proportion for architectural compatibility and visual consistency (Fig. 8.6).

8.3.3.7.1 Discourage Bird Habitat. When designing new construction, consider the use of design components that discourage birds from nesting on buildings. Birds and bird droppings are a nuisance, damaging to buildings and unhealthy to the human work environment. The following architectural features are attractive to birds and should not be used unless proper measures are taken to discourage their attractiveness to birds:

- Deep, uninhabited porches
- Flat architectural relief that projects from buildings or structures at least 4 inches
- Deep window sills
- Exposed gutters
- Flat and accessible areas under open stairs
- HVAC equipment that provide a water source for birds

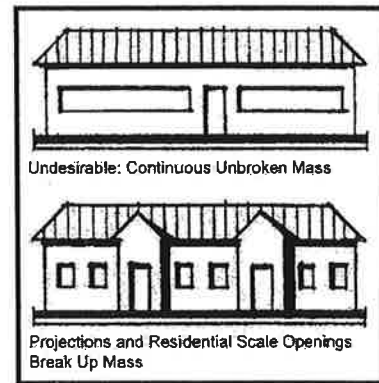


Fig. 8.6 - Fenestration Breaks Up Mass.

8.4 BUILDING ENTRANCES

8.4.1 The building entrance is a primary feature of any building design. It should be defined and recognizable as the point of entry regardless of the size or importance of the building (Fig. 8.7).

8.4.2 The entrance to a building should be in a prominent location and should be oriented toward the primary adjacent public spaces such as a courtyard, lawn, parking lot, or street.

8.4.3 The details of an entrance should be designed to

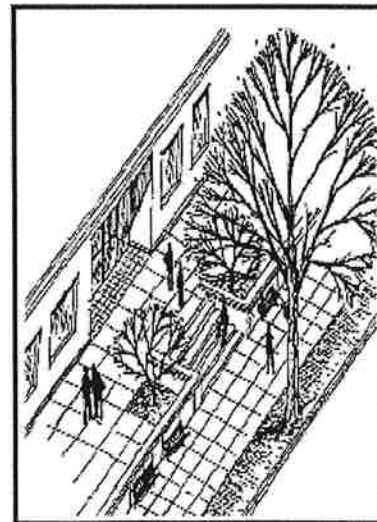


Fig. 8.7 - Entrance is Positive Visual Experience

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provide continuity with other entrances to the building and the entrances of adjacent buildings.

8.5 SERVICE AREAS

8.5.1 Service areas, such as loading docks and trash dumpsters, should be screened from the views of primary use areas such as entrances, courtyards, gathering areas, streets, and parking lots.

8.5.2 Service areas should be enclosed by masonry or rock walls. Screen walls should be between six and eight feet high and should be in harmony with the adjacent building.

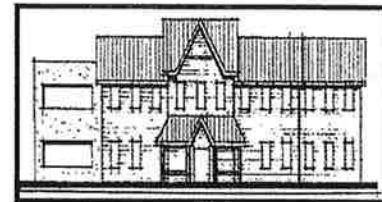
(Fig. 8.8)

8.5.3 Trash and garbage collection areas must be located a minimum of 25 meters (82 feet) from troop billeting, family housing areas (containing more than 12 units), and stand-alone retail facilities (UFC 4-010-01, Table B-1).

8.6 NOT USED



Fig. 8.8 – Screened Loading Dock



Not This This
Fig. 8.10 – Renovation/ Additions
should be Compatible.

8.7 NOT USED

8.8 INDIGENOUS STRUCTURES

Sustainability in the design and construction of buildings includes incorporating time-proven building designs that are indigenous to the region. Indigenous design elements should be utilized in the design of new buildings (Fig. 8.11).



Fig. 8.11 – Building with Stucco Finish

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8.14.1.2 Use the following guidelines when selecting exterior building materials.

8.14.1.2.1 Choose materials for their longevity and maintenance characteristics.

8.14.1.2.2 Use materials with integral colors - avoid painting exterior colors.

8.14.1.2.3 Use installation standard colors for exterior walls. Add accent colors sparingly. Accent colors can be used in recesses and to accent certain portions of a buildings façade.



Fig. 8.21 – The Medical Center
at WBAMC

8.14.1.2.4 Exposed exterior materials shall not require periodic repainting. Preferred materials are factory prefinished, integrally colored, or have similarly intrinsic weathering finishes. Ferrous metals shall not be exposed to the weather unless prefinished with a protective coating that has a minimum 20-year warranty.

8.14.1.2.5 Use dark bronze anodized aluminum for exterior windows. Use dark bronze anodized aluminum storefront doors for Main Entrance doors.

8.14.1.2.6 ~~Use blended colors, T lock type, on shingle pitched roofs;~~ fully adhered white 45 mil chlorosulfonated polyethylene (CSPE) or 60 mil Thermo Plastic Olefin (TPO), ¼" to 12" slope for "flat" roofs.

8.14.1.2.7 If a stucco look is desired, more durable materials such as EIFS or stucco-like finish on prefabricated metal panels or concrete panels shall be used. If EIFS is used a heavy duty reinforcing mesh shall be used around all doors and window openings, and extend a minimum 8'0" above finished floor elevation on all exterior walls. The heavy duty reinforcing mesh used on the EIFS shall have a minimum combined weight of 20 ounces per square yard and this standard can be met by using two layers. Use high impact mesh on all other surfaces.

8.14.1.2.8 NOT USED

8.14.1.2.9 Metal, wood, or vinyl siding should not be used. Vinyl or wood trim should not be used.

8.14.1.2.10 Satellite dishes, whether roof mounted or ground mounted, are not allowed. This requirement does not apply to Family Housing, nor to McGregor Range.

8.14.1.2.11 Not Used.

8.14.2 Appendix K, Exterior Materials Charts list the building materials applicable to the visual zones listed. – Under Development

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8.14.3 Exterior Building Color

8.14.3.1 Color charts have been developed for specific geographical areas giving consideration to climate, geography, culture, facility function, historical context, architectural character, etc. Color changes will be implemented during normally scheduled paint cycles (see [Appendix L, Exterior Color Charts](#) – Under Development).

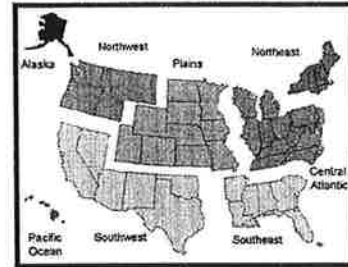


Fig. 8.22 - The Geographical Areas for Exterior Colors.

8.14.3.2 Color is closely linked to the appropriate selection of exterior building materials and is a critical design element in relating adjacent buildings and creating a compatible visual environment within an installation.

8.14.3.3 Overhead doors color shall be light beige or white.

8.14.3.4 Historic Buildings. Repaint the building or structure to match the existing colors or colors that can be documented to have been used on that building.

8.15 KEY FACILITY TYPES STANDARDIZATION

8.15.1 The Assistant Chief of Staff for Installation Management (ACSIM) establishes Army facility standards and approves deviations from the standards.

8.15.2 Residential Communities Initiative

8.15.2.1 The intent of the Residential Communities Initiative (RCI) is to improve the housing for military families by providing quality housing in attractive neighborhoods.

8.15.2.2 The Military Housing Privatization Initiative (MHPI) legislation allows developers to build and renovate housing to local standards. In those areas where local standards do not meet the quality of life requirements of soldiers, the Community Development and Management Plan (CDMP) process allows a negotiated determination of those standards. To ensure a uniform level of quality throughout RCI, Headquarters, Department of the Army has developed new construction and renovation standards for RCI family housing to be used as reference points during CDMP preparation. These standards are routinely updated. Revisions apply to CDMP collaboration contracts awarded within specific time frames and are not retroactive to previous projects.

8.15.2.3 All RCI projects planned or under design will meet the "Gold" SPiRiT rating (as of 18 March 2003). See [Assistant Secretary of the Army Memorandum Subject: Sustainable Design and Development Requirements, dated 18 March 2003](#).

8.15.3 Not Used

8.15.5 Army Lodging.

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SECTION 10

LANDSCAPE DESIGN STANDARDS

10.1 INTRODUCTION

10.1.1 The Landscape Design Standards includes selection, placement, and maintenance of plant material on the installation. Landscape plantings provide a simple and cost effective enhancement to the general appearance of the installation.

10.1.2 The visual image conveyed by a military installation is defined not just by architectural character and site organization, but also by an attractive, organized landscape design. The presence of plant material on the installation greatly enhances the visual character and environmental quality of the installation.

10.1.3 Plantings add an element of human scale to open spaces and can be used functionally to screen undesirable views, buffer winds, reinforce the hierarchy of the circulation system, or provide a visual transition between dissimilar land uses.

10.2 LANDSCAPE OBJECTIVES

10.2.1 The overall objective of the use of plant material within the installation is to improve the physical and psychological well being of the people who live and work on the installation. This is achieved through the following objectives:

10.2.1.1 Preserve and enhance natural desert terrain where applicable.

10.2.1.2 Because trees are the largest and most visible vertical elements in the landscape, the most benefit to the appearance and physical environment of the Fort Bliss is achieved through the addition of trees. Trees must be the primary element and type of plant material in the Fort Bliss landscape to conserve water and minimize maintenance. Use shrubs and ground cover primarily as accent elements to delineate building entrances and special outdoor spaces such as plazas and patios, and at vehicular entryways.



Fig. 10.1 -Use Locally Adapted Plants to Improve Visual Quality

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Improve the overall visual quality of the installation through the use of native or locally adapted plant material to (Fig. 10.1):

10.2.1.2.1 Blend built environment with the natural environment.

10.2.1.2.2 Provide scale and comfort to pedestrian environments (Fig. 10.2).

10.2.1.2.3 Reinforce the hierarchy of the circulation system (Fig. 10.3).

10.2.1.2.4 Screen unsightly views or elements.

10.2.1.2.5 Buffer incompatible land uses.

10.2.1.2.6 Minimize maintenance through the use of native plant materials that require less maintenance to survive.

10.2.1.2.7 Enhance antiterrorism capabilities.

10.3 PRINCIPLES OF LANDSCAPE DEVELOPMENT

10.3.1 Landscape design is based on the following principles.

10.3.1.1 **Unity.** The selection and placement of plant material can blend, screen, and soften incompatible architectural or other unattractive visual impacts. Plant material as a unifying element can be placed in front of a building or view to frame and enhance the visual impact.

10.3.1.2 **Balance.** Except in some historic areas, informal planting designs which utilize masses of plant materials rather than rows and hedges are most desirable. Not only do such designs offer more visual interest, but, generally, they require less maintenance. Also in an informal design, when one or a few plants die, the design intent is less likely to be lost than in a formal design.

10.3.1.3 **Contrast.** Plant material can be selected and placed to provide differences in size and shape that add interest to the environment. Plants can be located to provide a backdrop for other plants such as by placing a hedge behind a bed of annuals or perennials.

10.3.1.4 **Rhythm.** Repetition of a single plant or a mass of plants provides visual interest and formality to the landscape. Rhythm



Fig. 10.2 – Provide Comfort to Pedestrians



Fig. 10.3 - Landscaping Reinforces Circulation Hierarchy.

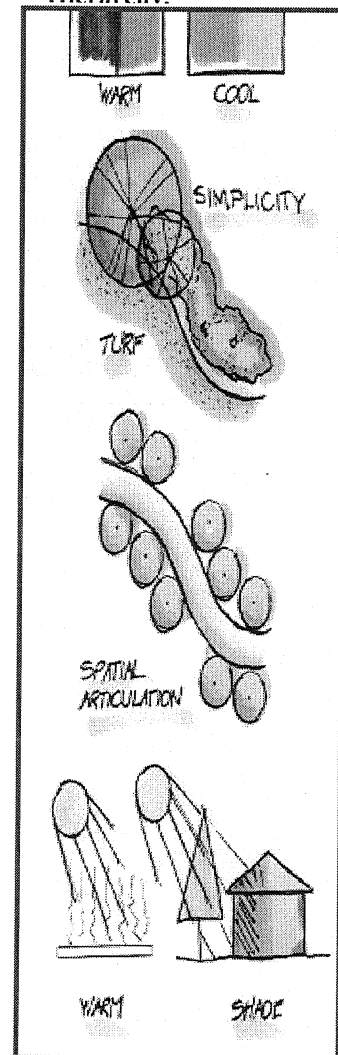


Fig. 10.4 - Principles of Design

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produces emphasis and unity and is especially effective in articulating main circulation routes.

10.3.1.5 Color and Texture. Plants can be selected and placed to provide visual interest according to their color and texture. Colors are classified as either warm (red, orange, yellow) or cool (violet, blue, green). Texture is classified as either coarse or fine.

10.3.1.6 Simplicity. Landscape plans should be broad and simple in form to limit excessive maintenance. Plants usually look better and achieve more impact when massed than when used alone. When groups of seven or less plants are used, odd numbers of plants make the most pleasing masses. Groups or clusters of plant materials should also be visually connected to successfully delineate space. Overspacing causes the composition to appear disjointed and is likely to increase maintenance.

10.3.1.7 Ultimate Effect. The landscape plan should be prepared with consideration for the mature size of all plants. The spacing of all material should utilize nursery industrial standards for mature material to account for spread as well as height. The ultimate height of the material should also be considered in relation to windows and other visual concerns.

10.3.1.8 Spatial Articulation. Plants can be selected and placed to create enclosed spaces or to separate spaces from one another. They can also be used to direct people by visually defining and reinforcing patterns of movement. The degree of enclosure, separation, or movement is dependent upon the density, form, and type of plants used.

10.4 SUSTAINABLE LANDSCAPE DEVELOPMENT

10.4.1 The use of plant material on the installation promotes the sustainability. Trees, shrubs, groundcover, and vines provide aesthetic appeal, energy conservation, climate modification, erosion control, air purification, wind/dust mitigation, reduction of glare and noise abatement (Fig. 10.5).

10.5 LANDSCAPE DESIGN GUIDELINES

10.5.1 Proposed plantings must be reviewed to ensure that site conditions (soil, topography, adjacent uses, and architecture) and climatic criteria (sun, shade, and moisture requirements) are considered in the desired plant design and selection (i.e., form, texture, color, size). The uses and users of the site must also be considered. Landscape planting plans should be approved by qualified personnel to provide quality assurance and promote design consistency within each visual zone.

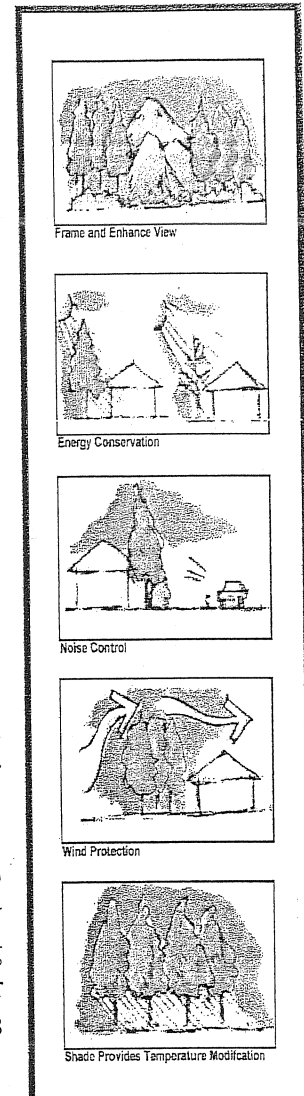


Fig. 10.5 - Plant Material Promotes Sustainability

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10.5.2 The following paragraphs present landscaping guidelines for the various locations of plant material use.

10.5.2.1 **Foundation Planting.** To conserve water and minimize maintenance, trees must be the primary element and type of plant material in the Fort Bliss landscape. Because trees are the largest and most visible vertical elements in the landscape, the most benefit to the appearance and physical environment of the post is achieved through the addition of trees (Fig. 10.6).

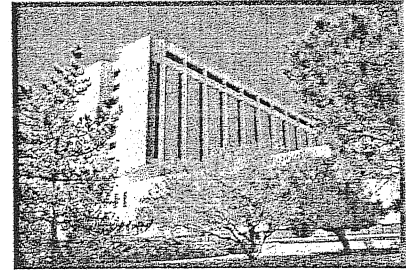


Fig. 10.6 – The Medical Center at WBAMC

10.5.2.1.1 Focal and seasonal plantings should be located at building entries for pedestrian interest.

10.5.2.1.2 Use the architecture of the building to evaluate the planting design and selection of plants.

10.5.2.1.3 Plant materials should not block windows and views from interior spaces.

10.5.2.1.4 Trees shall be set back from the building walls to provide space for mature growth and to prevent root systems from damaging the foundation.

10.5.2.1.5 Except in some historic areas, informal planting designs which utilize masses of plant materials rather than rows are most desirable.

10.5.2.1.6 Due to the possibility of insect problems (bee stings, etc.), do not plant flowering plants near entrances.

10.5.2.2 Screening.

10.5.2.2.1 **Windscreens.** Measures to mitigate high winds and blowing dust must be considered for very large open areas such as parking lots, perimeter open space areas and recreational areas. Plant materials can be used for wind control by breaking, directing or filtering the wind. Use a combination of evergreen and deciduous trees to provide windbreak protection from prevailing winds. Windbreak plantings should be irregular in form, rather than straight and evenly spaced, in order to provide more effective wind control and to visually blend with the natural character of the installation.

10.5.2.2.2 Not Used.

10.5.2.3 **Buffer Planting.** Use a mixture of evergreen and deciduous trees and shrubs to visually separate land uses and to help separate visual zones or to screen unpleasant views or noises (Fig. 10.7).

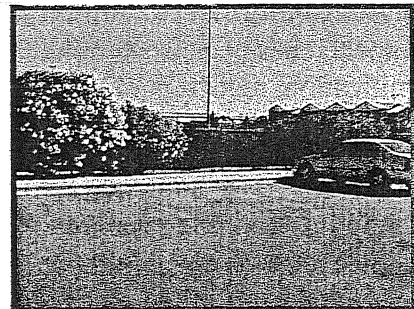


Fig. 10.7 – Buffer Planting

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10.5.2.4 Open Space Planting / Natural Recovery Areas. The preservation and enhancement of existing landscape is encouraged (Fig. 10.8).

A program directed to allow natural recovery in almost 100 large open areas on Fort Bliss is ongoing (Fig. 10.9). The main objective is to suppress dust emissions from these areas during wind events that are common in the region. Dust is a nuisance for people in many ways: it increases the need for cleaning inside homes and working spaces, creates accumulation of soil around buildings and against walls, and commonly produces a safety risk factor as visibility is greatly reduced for motorists (Fig. 10.10).

There are more than 40 locally adapted plants that are able to get established naturally in open soil, including native and exotic species, which can live with natural rainfall. This eliminates the need for maintenance.

The following is a list of recommended actions to promote both natural vegetation recovery and aesthetics in these open areas. This approach is applicable to any open areas where the soil has been disturbed.

Initial preparations. Level soil to desired grade, leaving a rough surface so it traps seeds and retains moisture. Do not disturb ground except to conduct the maintenance described below. Soils left alone, even without vegetation, produce less dust than disturbed surfaces.

Year 1 and 2. Conduct bush-hogging at 8 inches in August and November to cut off the tops of taller vegetation and protect low-growing plants. This will allow them to grow and produce new seeds. Any undesirable tumbleweeds that proliferate during this period will be gradually outcompeted by other native vegetation and can be controlled by bush-hogging.

Year 3. If tumbleweeds are still present, mow at 8 inches in August and November. If these plants are nearly absent, mowing may be optional to improve area appearance. Do not mow less than 6 inches high.

Year 4 and on. Areas may be left undisturbed to protect vegetation cover and soil. Dust emissions should be greatly reduced or eliminated by this time. To improve appearance in highly visible areas mowing to 6 inches may be conducted in June or November.

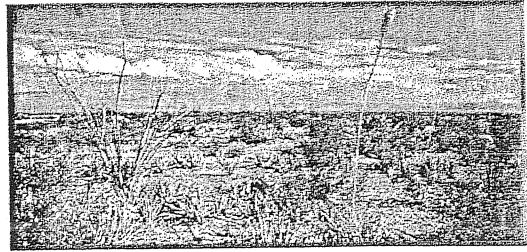


Fig. 10.8 – Desert Vegetation



Fig. 10.9 - Natural Recovery Area

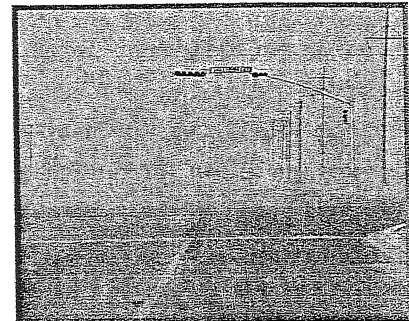


Fig. 10.10 – Dust Problem

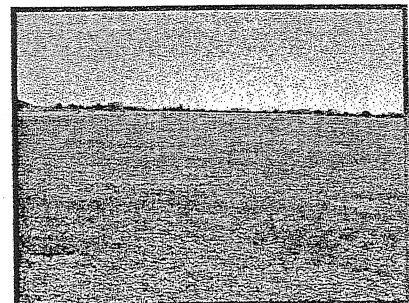


Fig. 10.11 - Ground Covered by Natural Vegetation in a Natural Recovery Area

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It is not recommended to clean the edges of areas with weed-eater machines that re-expose the soil. This promotes the establishment of tumbleweeds along the perimeters, creating more work to remove them, as they are a source for seeds that may invade recently-recovered areas.

10.5.2.5 Street Trees. Street tree plantings should be used to reinforce vehicular hierarchy, orient and direct traffic, upgrade views, and to visually de-emphasize on-street parking (Fig. 10.12). Also, in the design of a street tree planting, separate plant species may be used to identify distinctive details or areas of the installation, for example, a particular land use relationship, historical district, community area, or other similar entity.

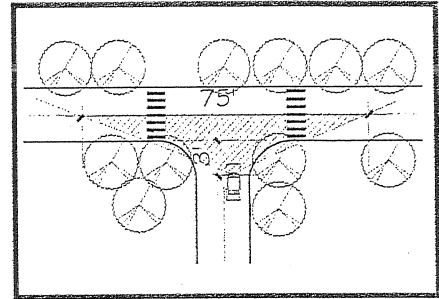


Fig. 10.12 – Use Street Trees to Visually Reinforce Road Hierarchy

10.5.2.5.1 Except in some historical areas, where specific landscape guidelines apply, use Mondel Pine, Afgan Pine, Honey Mesquite, Washingtonia Palm Tree, and Desert Willow street trees in clusters to visually reinforce primary and secondary roads (Fig. 10.13).

10.5.2.5.2 Except in some historic areas (where specific landscape guidelines apply), use informal groupings of street trees along tertiary routes. Utilize medium size trees to screen on-street parking along roadways. Set trees 1 to 2 meters (3 to 6 feet) from the back of curbs.

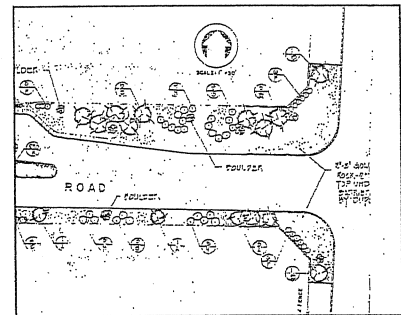


Fig. 10.13 - Trees and Plants in Clusters.

10.5.2.5.3 As a general rule, street trees should be resistant to salt and root pressure, and should have a 10' to 12' high clearance between the street pavement and branch height to allow adequate clearance for pedestrian and vehicle traffic to pass unimpeded by lower branches.

10.5.2.5.4 The street tree layout should be coordinated with the layout of proposed street lighting.

10.5.2.5.5 Appropriate plant heights should be used within sight triangles to ensure safe views from intersections.

10.5.2.5.6 Weeping trees should not be used where they may hang over roadways or block views.

10.5.2.6 Parking Lot Planting. Parking lots are often the least attractive elements on a military installation. The use of landscape plant material and earth berms can greatly improve the appearance of these areas, while helping to define circulation and reduce heat gain during summer months (Fig. 10.14).

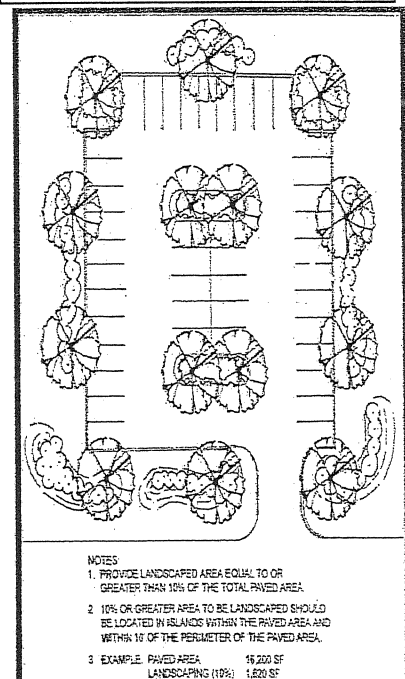


Fig. 10.14 - Provide Parking lot Planting to Reduce Heat Gain

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February 2009

10.5.2.6.1 Use shade tree plantings at parking lots to reduce glare and moderate ambient air temperatures on the lot. Optimum spacing of parking lot shade trees is 10 to 12 meters (35 to 40 feet) on center.

10.5.2.6.2 Choose trees and shrubs that require minimum maintenance and will not litter the parking area with leaves, fruit, or nuts.

10.5.2.6.3 Consider sight distances near entrances and exits when selecting and placing plant material.

10.5.2.6.4 Select trees, shrubs, and ground covers that can withstand harsher conditions, such as sun, glare, heat, and reduced water supply.

10.5.5.6.5 Use a mix of evergreen and deciduous plant material to screen parking areas from adjacent uses.

10.5.2.7 Environmental Control Planting. When properly placed, plants can provide environmental benefits, as well as address visual concerns.

10.5.2.7.1 Use deciduous trees and shrubs at courtyards, buildings and along streets to provide shade, moderate temperatures and reduce glare during the summer months while allowing solar exposure in the winter.

10.5.2.7.2 Locate deciduous plantings on the southeast and southwest corner of buildings or courtyards to mitigate solar radiation and glare due to heat build-up and lower sun angles in the mid-morning and late afternoon hours.

10.5.2.7.3 Use mixed massings of deciduous shrubs and evergreen trees and shrubs to provide sound control along primary and secondary roads.

10.5.2.8 Image Planting. The image of the installation is formed by the visual impressions that exist within the installation. The primary locations of highly visible images are the main gate, along primary circulation systems, and at areas of high concentrations of people. Features such as signs, statues, static displays, and other primary visual images can be improved by the use of trees, shrubs, and ground cover.

10.5.2.9 Entrances to the Installation. The entrances and streetscapes into the installation are areas to place landscaping that will develop a strong visual image and provide visual interest during all four seasons. The entrance to the installation creates the first visual impression for the visitor.

10.5.2.9.1 The landscape materials and planting areas should be proportional in scale to the hierarchy of the street on which they are located.

10.5.2.9.2 Landscaping must be integrated with the Force Protection requirements of Section 12. Low shrubs, groundcover, annual/perennial plants and canopy trees provide

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seasonal interest as well as maintain views required to ensure force protection measures. Adequate lines of sight must be maintained for guard personnel to observe vehicular and pedestrian traffic approaching the gate.

10.5.2.10 Zeroscaping. Zeroscaping is the use of only inert materials such as rock, gravel, bricks and pavement. When absolutely necessary, zerospacing may be the only option. For a zeroscape installation, landscape rock or gravel will be underlaid with 6-mil plastic. Finished surface is to be 1" below top of curbs and paving. Landscape rock will be 1" – 1.5" and approximately 2" deep. 1" fines will be placed on the plastic to keep the rock from tearing it. Pea gravel is not desirable in areas where pedestrians walk. (Note: Zeroscaping is not the same as "Open Space Planting and Treatment Management" described in 10.5.2.4.)

10.5.2.11 Xeriscape. Xeriscape is the use of water-saving landscape designs incorporating desert-adapted plants. It may also include sections of rock landscapes that are typical of zeroscaping (para 10.5.2.10). Instead of 6-mil plastic use woven polypropylene weed barrier. Creative xeriscapes not only look attractive, but also save money, water and maintenance. All tree/plants in a xeriscape installation will be provided with automatic drip irrigation.

10.6 PLANT MATERIAL SELECTION

10.6.1 Trees, shrubs, ground cover and turf are the major elements of a planting composition. Basic plant selection criteria should consider creating a unified composition utilizing native materials for low maintenance and sustainability, avoiding incompatible colors, textures and forms, and matching the appropriate plant to the land use, situation, and environmental condition. Also, plantings in designated historic areas only should follow the Fort Bliss Landscape Handbook for Historic Residences.

10.6.2 The ability of plant material to provide lasting benefit is dependent upon the plant's hardiness and its appropriateness to the site use. Major factors affecting plant hardiness are soil type and organic content, temperature, moisture and light. These climatic conditions can be modified to an extent by specific site conditions, such as wind protection, solar orientation, and planting design, to create microclimates.

10.6.3 Selecting appropriate plants for a given condition is only one aspect of planting design. Compositional arrangement to provide texture variety and to accent site and building features is another. The selection and composition of a planting design requires an understanding of each plant's characteristics, form, and environmental needs as well as how each plant can relate to and complement other plants in the design. Plants are used in four basic design categories (Fig. 10.15):

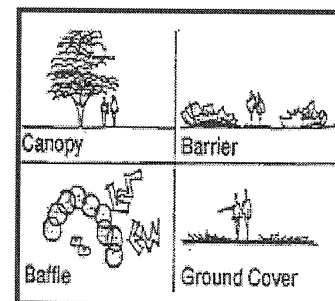


Fig. 10.15 - Four Basic Design Categories

- Canopy
- Barrier
- Screen (or Baffle)

APPENDIX BB

Utility Meter Specifications and Details

Transformer and Electric Meter Specification

Abbreviations:

LDE Land Development Engineer

D/B Design Build Contractor

The following items shall be furnished and installed by the D/B contractor:

1. Structural concrete pad for transformer as detailed on drawing U-837 with the following:

- Extend secondary conduit duct bank to facility service equipment and metering conduit to communications room, furnish and install secondary service conductors and terminate secondary conductors at transformer.
- Add secondary conduits, if required, to match facility service entrance requirements.
- Eight bolts to fasten transformer pad to the vaults

Clarifications—The transformer pad shall be set on concrete vaults furnished and installed by the LDE. The transformer pad is identified as "LID L2" on the attached drawing U-837. The two "LID L1" and the compacted gravel under the transformer pad shall be furnished and installed by the LDE. Secondary and metering conduit ductbank stub-out from vault shall be furnished and installed by the LDE.

2. Outdoor pad-mounted oil-filled transformer with the following ratings and accessories:

- 13.8kV-3Ø-3W Delta primary and 3Ø-4W secondary
- Insulating liquid—Mineral oil: ASTM D 3487, Type II, tested in accordance with ASTM D 117. Provide identification of transformer as "non-PCB" and "Type II mineral oil" on the nameplate.
- High voltage compartment minimum 24" deep from tank to inside of hinged door to accommodate elbow surge arrester connected to 600A dead-break elbow.
- Radial feed with oil immersed primary load-break switch
- Three 600A dead-break bushings with parking stands
- Surge arresters IEEE C62.11, rated 18 kV, 15.3 MCOV, fully shielded, dead-front, metal-oxide-varistor, elbow type with resistance-graded gap, suitable for plugging into inserts. Provide three arresters for radial feed circuits. Surge arresters shall be delivered to Contracting Officer for installation by LDE.
- Ground pads
- Factory installed secondary electronic metering (See item 3 below)
- Tap changer, no-load, externally operable with four 2.5% taps—two above and two below rated primary voltage.

Clarifications—the transformer shall be set on the transformer pad by the D/B contractor. LDE shall furnish and install the 13.8kV conductors, 600A dead-break elbow connectors and connect ground ring ground wires to the ground pads. The LDE shall

install the surge arresters furnished by the D/B contractor. The 13.8kV electrical distribution system is a low-resistance neutral grounded system.

3. Socket mounted electronic programmable outdoor watt-hour meter, surface mounted flush against the side of the low voltage compartment with the following ratings and accessories:
 - Meter shall be designed for use on a 3Ø-4W system with current transformers. Current transformer shorting terminal strips shall be furnished.
 - Include necessary KYZ pulse initiation hardware for Energy Monitoring and Control System (EMCS).
 - The meter shall be Class 20, Form 9S with an accuracy of +/- 1.0 percent
 - Meter fusing—provide a fuse block mounted in the secondary compartment containing one fuse per phase to protect the voltage input to the watt-hour meter. Size fuses as recommended by the meter manufacturer.
 - The meter cover shall be polycarbonate and lockable.
 - The kilowatt-hour register shall be 5 digit electronic type with a solid state demand register and meter reading multiplier. Demand intervals shall be 15 minutes with rolling demand up to 6 subintervals per interval.
 - The meter socket shall be NEMA 3R, box mounted and have automatic circuit closing bypass and having jaws compatible with requirements of the meter. Paint to match transformer.

WATER METER SPECIFICATIONS

1.1. Displacement Type Meters

Meters 2" in size and smaller shall be displacement type meters. Displacement type meters shall conform to AWWA C700. Registers shall be straight-reading and shall read in U.S. gallons. Meters in sizes 1/2 through 1 shall be frost-protection design. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be an encoder type remote register designed in accordance with AWWA C707. Meters shall comply with the accuracy and capacity requirements of AWWA C700.

1.2. Turbine Type Meters

All meters 2.5" and larger shall be turbine type meters. Turbine type meters shall conform to AWWA C701 Class I. The main casing shall be bronze with stainless steel external fasteners. Registers shall be straight-reading type, shall be permanently sealed and shall read in U.S. gallons. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be an encoder type remote register designed in accordance with AWWA C707. Meters shall comply with the accuracy and capacity requirements of AWWA C701.

1.3. Compound Type Meters

Compound type meters shall conform to AWWA C702 and shall be furnished with strainers. The main casing shall be bronze with stainless steel external fasteners. The main casing shall be tapped for field testing purposes. Registers shall be straight-reading type, shall be permanently sealed and shall read in U.S. gallons. The meter shall be equipped with a coordinating register. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be an encoder type remote register designed in accordance with AWWA C707. Meters shall comply with the accuracy and capacity requirements of AWWA C702.

1.4. Meter Vaults

Meters 2.5" and larger in size shall be installed in reinforced concrete vaults in accordance with the El Paso Water Utilities Public Service Board Detail No. 290-3 and Detail No. 294. Meter vaults and covers within roadways and POV paved areas shall be rated for H-20 loading. Meter vaults and covers within GOV areas and access drives shall be rated for the heaviest proposed loading in the parking area.

1.5. Meter Boxes

Meters 2" in size and smaller shall be set in reinforced concrete meter boxes in accordance with the El Paso Water Utilities Public Service Board Detail No. 290-2 and Detail No. 293. The boxes shall be of sufficient size to completely enclose the meter and shutoff valve or service stop. Meter boxes set in paved areas subject to vehicular traffic shall be concrete with cast iron lid and cast iron meter reader lid. Boxes set in sidewalks, not subject to vehicular traffic, shall use concrete covers with cast iron meter reader lids. Plastic boxes and lids shall not be used in any area. Box height shall

extend from invert of the meter to final grade at the meter location. The lid shall have the word "WATER" cast in it.

1.6 Accessories

Provide a 1" conduit from each meter vault or meter box to the building mechanical room. Provide an accumulator and data pulse logger for each building complying with the following:

The Pulse Logger must be web-enabled and be capable of recording pulses from gas or water meters. It must be able to accept at least 4 pulse inputs. The logger must have Ethernet communication capabilities. Consumption data must be transmitted either via email and/or ftp in XML formats. The Pulse Logger's features and capabilities must include:

- ⇒ View Load Profile data using the built in Web Server.
- ⇒ Transmits reports via email or ftp or both.
- ⇒ CC a secondary email recipient.
- ⇒ Open Protocols XML, HTTP, SMTP, SNTP, FTP, DHCP, DNS.
- ⇒ Compact size 3.0" X 3.25" X 1.25".
- ⇒ Comes with a 110~220 VAC to 12VDC power supply.
- ⇒ RJ45 Ethernet Network jack.
- ⇒ ROHS Compliant for Europe.
- ⇒ Safe log-in to the Web Server via password authentication.
- ⇒ Secure data storage in non volatile memory with Lithium Ion Battery backup.
- ⇒ Lithium Ion Battery backup for storing data during power outages.
- ⇒ Recharging of Lithium Ion battery occurs automatically.
- ⇒ High measurement rate of up to 100 pulses per second.
- ⇒ Compatible with any network using DHCP or static IP Addressing.
- ⇒ Uses SNTP for highly accurate time stamping.
- ⇒ Day Time client integrated if SNTP server is not accessible.
- ⇒ International Time Zone support.
- ⇒ User Configurable
 - Logging interval from 5 minutes to 60 minutes.
 - Reporting interval from 5 minutes to hourly, daily, or weekly.
 - 16 character alpha numeric ID.
 - 20 character alpha numeric Serial Number.
 - 80 character Location / Address.
 - User configurable SNTP server.
 - Time Stamps can be in USA or European format.

Connection to the base wide EMCS system will be by others and is not included in this scope of work.



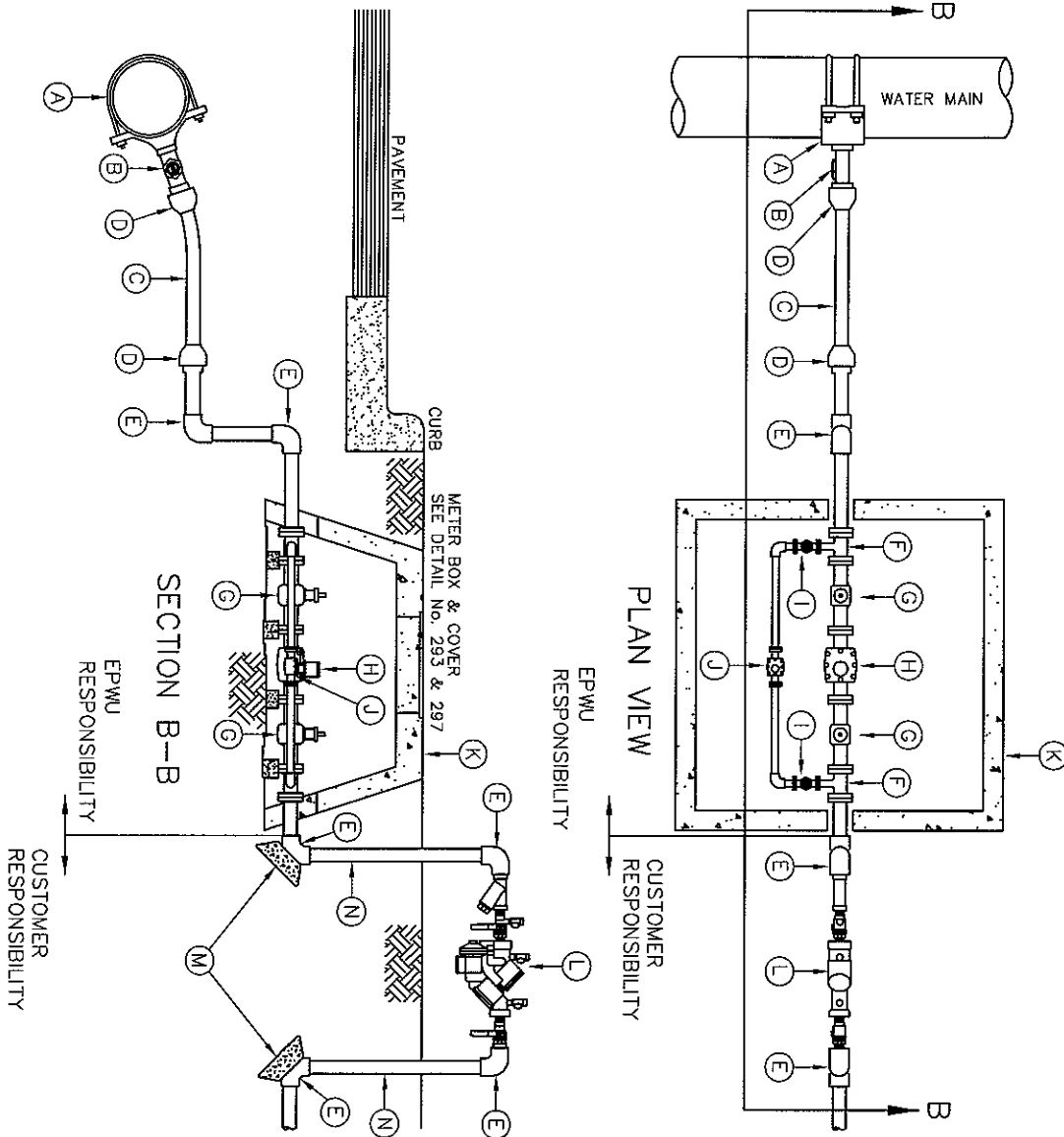
STANDARD
DETAIL

DATE: 12/12/1996
REV: 7/24/2001

TYPICAL 1 1/2" SERVICE LINE
INSTALLATION BY PSB
N.T.S.



DETAIL No.
290-2



GENERAL NOTES:

1. DETAIL SHOWN FOR 1 1/2" SERVICE. INSTALLATION SIMILAR FOR 2" SERVICE EXCEPT FOR SIZES OF PIPE, FITTINGS AND METER. WHEN SPECIFIED A 1" BY-PASS METER SHALL BE INSTALLED WITH A 1 1/2" SERVICE. A 2" SERVICE SHALL INCLUDE A 1" BY-PASS METER
2. WHERE NO CURB EXISTS, METER IS TO BE SET NEAR PROPERTY LINE OR AT DESIGNATED LOCATION.
3. THE EPWU WILL FURNISH AND INSTALL ALL NECESSARY PIPE, FITTINGS, METER BOXES, AND METERS REQUIRED. IT SHALL BE THE RESPONSIBILITY OF THE PRIVATE OWNER TO HAVE A CERTIFIED PLUMBER INSTALL A BACKFLOW PREVENTER AND EXTEND SERVICE LINE ON DISCHARGE SIDE OF METER.

CONSTRUCTION KEY NOTES:

- A. SERVICE SADDLE
- B. 1 1/2" TAP WITH CORPORATION STOP
- C. 1 1/2" COPPER PIPE. FOR 1 1/2" & 2" SERVICE INSTALLATIONS, ALL PIPING SHALL BE COPPER AND ALL FITTINGS SHALL BE BRONZE UNLESS OTHERWISE SPECIFIED.
- D. UNION
- E. BEND 90°
- F. TEE
- G. 1 1/2" GATE VALVE
- H. 1 1/2" TURBINE METER
- I. CURB VALVE
- J. 1" BY-PASS METER
- K. STANDARD METER BOX TYPE "C"
- L. BACKFLOW PREVENTER WHEN REQUIRED BY EPWU
- M. THRUST BLOCKING AS REQUIRED
- N. 1 1/2" BRASS PIPE-LENGTH AS REQUIRED



STANDARD
DETAIL

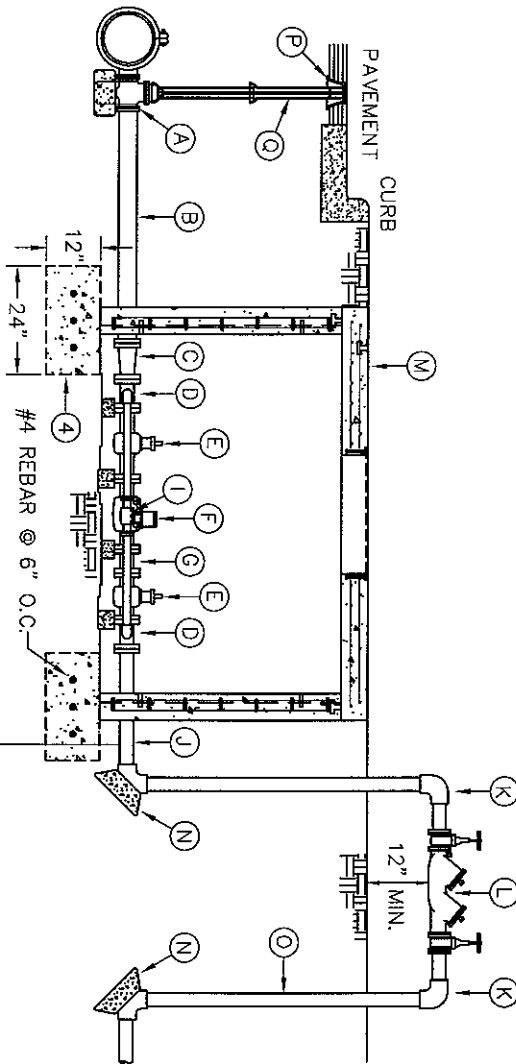
DATE: 1/29/1997
REV: 7/25/2001

TYPICAL 3" AND LARGER
SERVICE LINE INSTALLATION BY PSB
N.T.S.



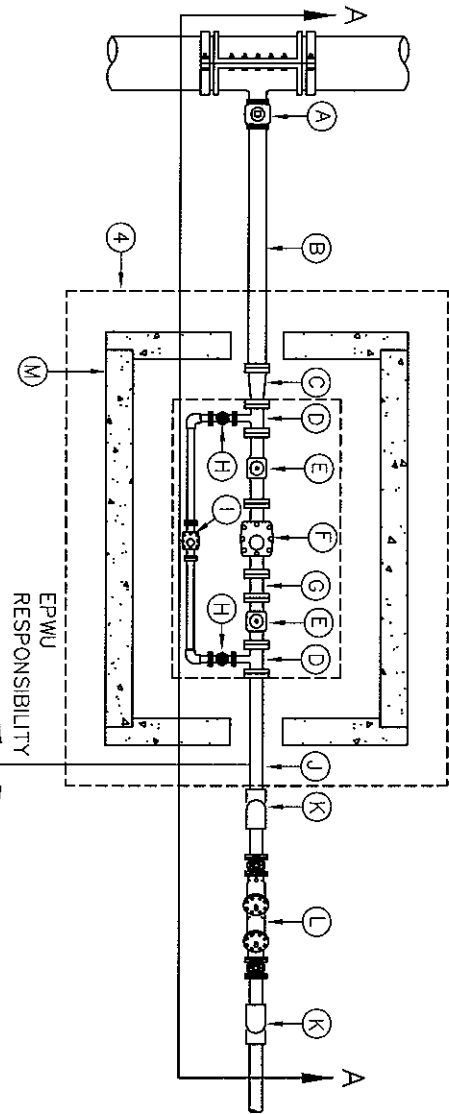
DETAIL No.
290-3

SECTION A-A



PLAN VIEW

CUSTOMER
RESPONSIBILITY



EPWU
RESPONSIBILITY

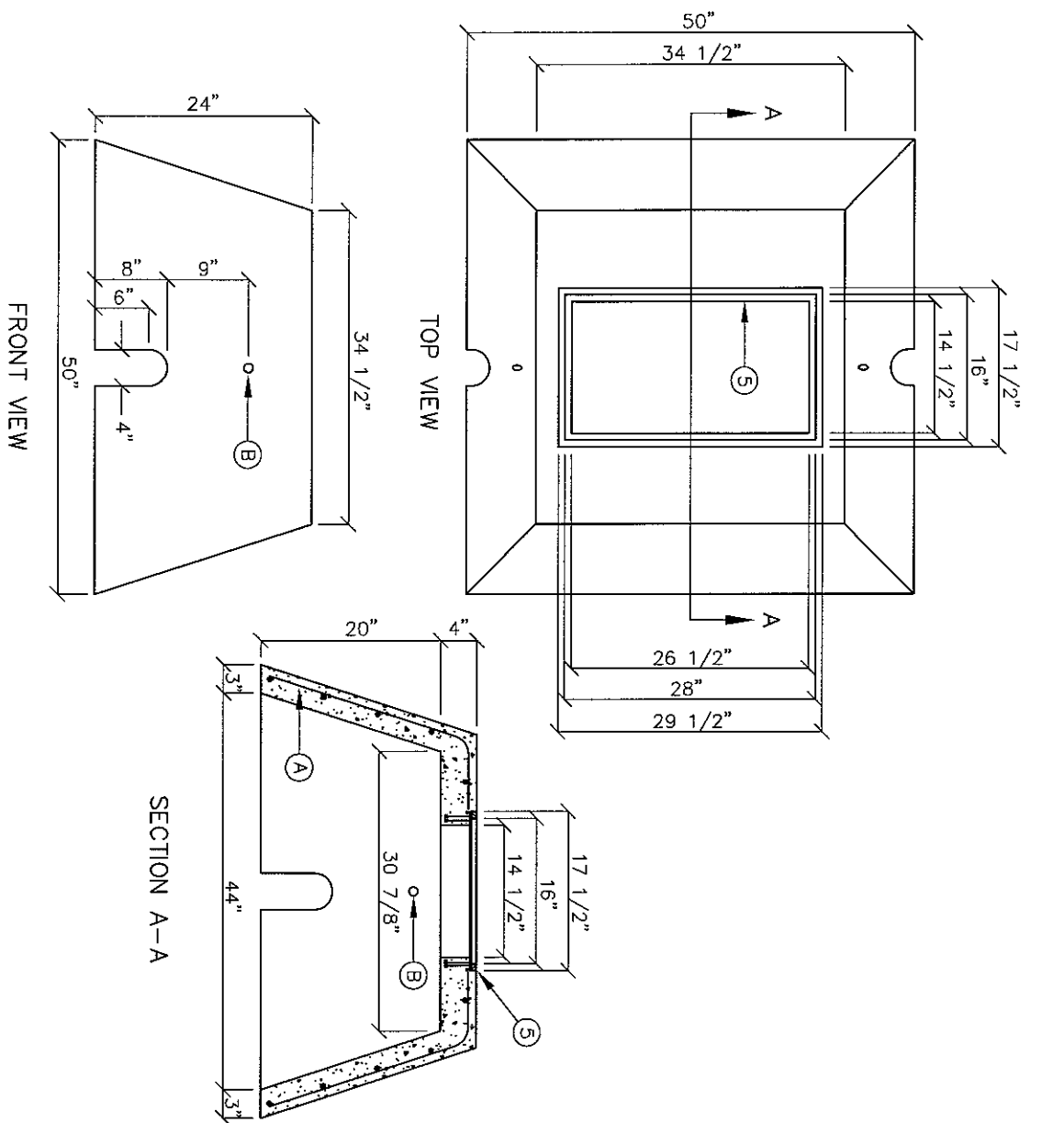
GENERAL NOTES:

1. DETAIL SHOWN FOR 3" SERVICE: INSTALLATION SIMILAR FOR LARGER SERVICES EXCEPT FOR SIZE OF PIPE, FITTINGS AND METER.
2. WHERE NO CURB EXISTS, METER IS TO BE SET NEAR PROPERTY LINE OR AT DESIGNATED LOCATION.
3. THE EPWU WILL FURNISH AND INSTALL ALL NECESSARY PIPE, FITTINGS, METER BOXES, AND METERS REQUIRED. IT SHALL BE THE RESPONSIBILITY OF THE PRIVATE OWNER TO HAVE A CERTIFIED PLUMBER INSTALL A BACKFLOW PREVENTER AND EXTEND SERVICE LINE ON DISCHARGE SIDE OF METER.
4. FOOTING REQUIRED WHEN PLACED UNDER EXISTING OR PROPOSED STREET PAVING.

CONSTRUCTION KEY NOTES:

- A. 4" TAPPING SLEEVE AND VALVE
- B. 4" P.V.C.
- C. 4"x3" REDUCER
- D. 3"x2" TEE
- E. 3" GATE VALVE
- F. 3" METER
- G. 3" TEST PLUG D.I.P.
- H. 2" GATE VALVE
- I. 2" BY-PASS METER
- J. 3" SPOOL D.I.P.
- K. 3" BEND 90°
- L. 3" BACKFLOW PREVENTER
- M. STANDARD METER BOX TYPE "D"
- N. THRUST BLOCKING AS REQUIRED
- O. 3" FLANGED D.I.P. - LENGTH AS REQUIRED
- P. BONNET BOX AND COVER IN ACCORDANCE WITH DET 269.
- Q. PIPE AS PER EPWU STANDARD DET 260.

STANDARD
DETAILAPR. 1994
REV. OCT. 1994METER BOX TYPE "C"
1 1/2" TO 2" SERVICE INSTALLATION
N.T.S.

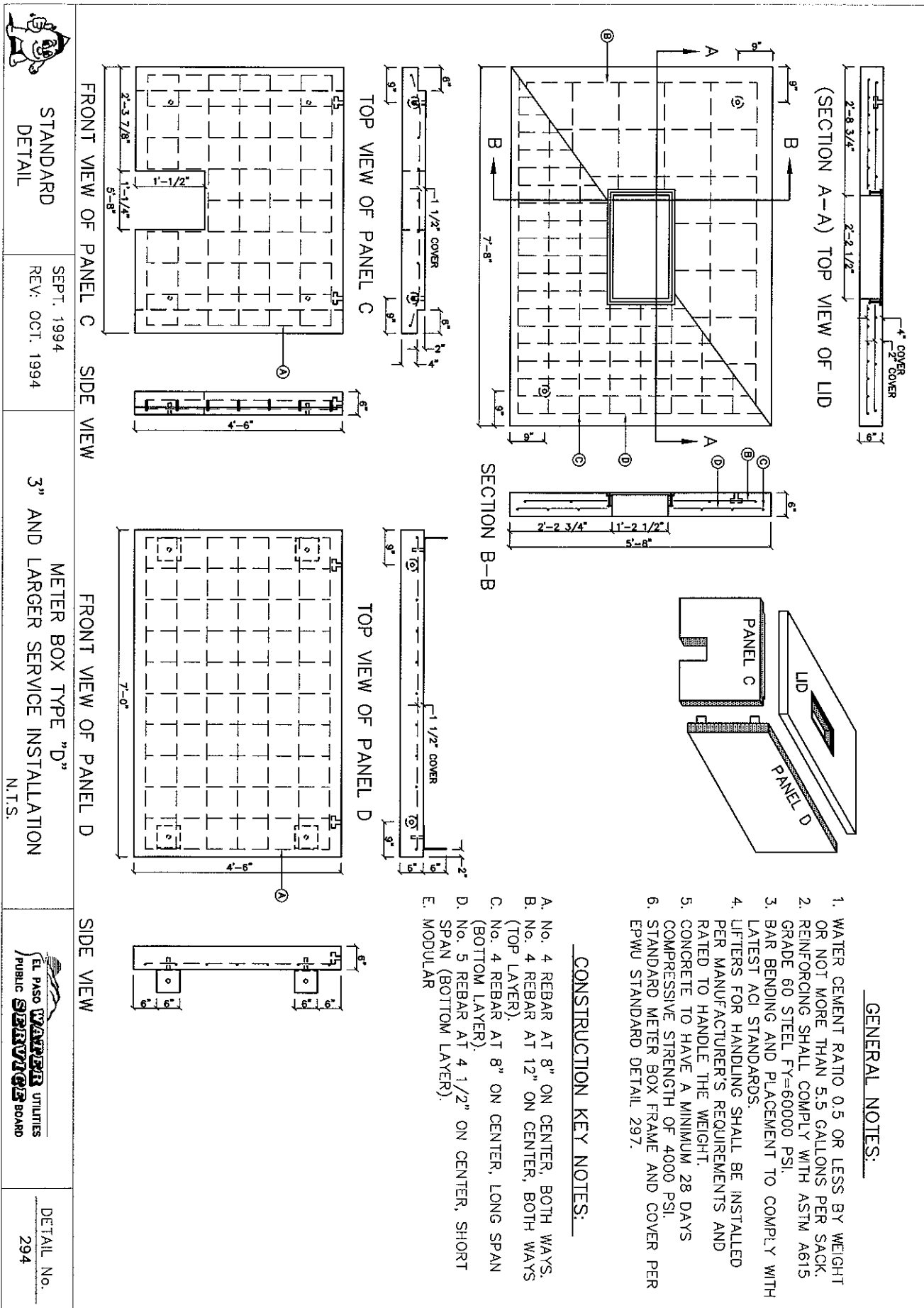
EL PASO WATER UTILITIES
PUBLIC SERVICES BOARD
DETAIL No.
293

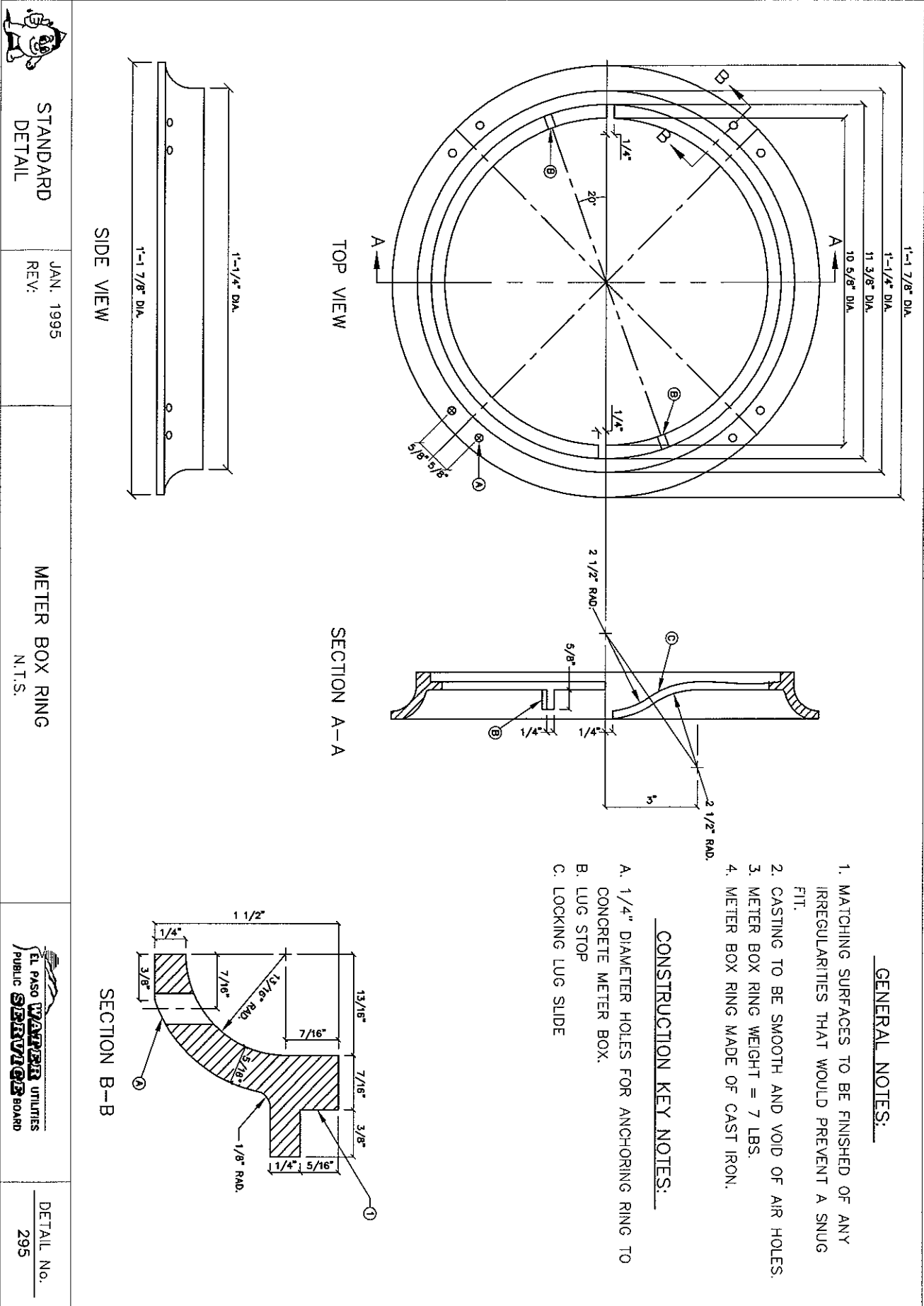
GENERAL NOTES:

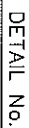
1. INSTALL TO GRADE MATCHING TOP OF CURB.
2. ANGLE VALVE SHALL BE IN LINE WITH THE INLET/OUTLET PORTS OF THE METER BOX.
3. METER BOXES SHALL NOT BE INSTALLED UNDER SIDEWALKS, DRIVEWAYS, OR PROPOSED ABOVE GROUND STRUCTURES.
4. WHERE NO CURBING EXIST, INSTALL BOXES IN ACCESSIBLE LOCATIONS BEYOND LIMITS OF STREET SURFACING, WALKS AND DRIVEWAYS.
5. STANDARD METER BOX FRAME AND COVER PER EPWU STANDARD DETAIL 297.

CONSTRUCTION KEY NOTES:

- A. No. 4 REBAR AT 6" ON CENTER, EACH WAY
- B. 1" DIAMETER HOLE
- C. SINGLE UNIT







- A. LETTERS TO BE 1" HIGH, 3/4" WIDE,
1/8" THICK
- B. LETTERS TO BE 3/4" HIGH, 5/8" WIDE,
1/8" THICK
- C. INSIDE LETTERS & RIBS 1/16" TALL
- D. OUTSIDE LETTERS 1/16" TALL
- E. REINFORCE BACK OF LUG
- F. REINFORCEMENT

APPENDIX CC

Waste Management Documents

El Paso and Regional Recyclers

<http://www.yellow.com/>

http://www.cleantexas.org/index.cfm?fuseaction=public.memberprofiles_bymembername_rtolquery1

<http://www.tceq.state.tx.us/assistance/P2Recycle/renew/renew.html>

Company	Address	Phone	Notes
Acoustic Tile			
WeRecycle, Inc.	500 South Broad St., Meriden, CT 06450	203-630-0344	carpet, ceiling tiles, pallets
Cardboard/Paper/Fiber			
Durango McKinley Paper Co	1520 Myrtle Ave., El Paso	915-351-7970	drop off services available
Master Fibers Inc.	1710 East Paisano Dr., El Paso	915-544-2299	drop off services available, top prices paid for cardboard, customized recycling program
Twin Cities Recyclers Co., Inc.	3230 Durazno Ave., El Paso	915-543-3000	top prices paid for paper, industrial plastics, metal, wood pallets, Customized recycling programs available
The UPS Stores	955 North Resler Dr., El Paso	915-842-8075	packing peanuts, cardboard, other packing material
Bryan Drive-In Recycling Center	2202 Briarcrest Dr., Bryan, TX 77802	979-209-5675	
Carpet/Carpet Tile			
Sunshine Padding and Foam	8172 Elder Creek Rd, Sacramento, CA 95824	916-383-5213	accepts carpet, padding, foam, mail in program
WeRecycle, Inc.	500 South Broad St., Meriden, CT 06450	203-630-0344	carpet, ceiling tiles, pallets
Landfill/Hauling/Collection			
Duncan Disposal/Alpine	3001 Old Marathon Hwy., Alpine, TX 79830	432-837-1244	Hauling, Collection, Landfill (approx 200 miles from El Paso)
Charter Landfill	12035 West Murphy St., Odessa, TX 79763	432-381-4722	landfill (approx 240 miles from El Paso)
Duncan Disposal/Midland	8220 West Hwy. 80, Midland, TX 79706	432-563-5060	Hauling, Collection (approx 260 miles from El Paso)
Saguaro Environmental Svcs	5055 South Swan Rd, Tucson, AZ 85706	520-745-8820	Hauling/Collection (approx 260 miles from El Paso)
Duncan Disposal/Lubbock	1408 N. Martin Luther King Blvd., Lubbock, TX 79403	806-762-6464	Hauling, Collection (approx 300 miles from El Paso)

Company	Address	Phone	Notes
San Angelo Landfill	1422 Hughes Ave., San Angelo, TX 76903	325-655-6869	landfill (approx 360 miles from El Paso)
TrashAway Svcs Duncan San Angelo	1422 Hughes Ave., San Angelo, TX 76903	325-653-6957	Hauling, Collection (approx 36 miles from El Paso)
Metal			
American Metal Recycling	11201 Alameda Ave., Socorro, TX	915-859-4916	
Asa Recycling	1042 Eastside Road, El Paso	915-779-3326	drop off services available
Discover Recycling	3845 Durazno Ave., El Paso	915-544-8414	drop off services available
El Paso Iron and Metal	1535 East San Antonio Ave., El Paso	915-532-6981	
Lopez Scap Metal, Inc.	351 North Nevarez Rd., El Paso	915-859-0770	drop off services available
Lucero Scrap	10717 Alameda Ave., Socorro, TX	915-872-9880	pick-up services available, provide containers
M&M Metal Inc.	12751 Pellicano Dr., El Paso	915-852-2080	
Shapiro Sales Co	206 Dodge Rd., El Paso	915-881-1991	drop off services available
Twin Cities Recyclers Co., Inc.	3230 Durazno Ave., El Paso	915-543-3000	top prices paid for paper, industrial plastics, metal, wood pallets, Customized recycling programs available
W Silver Recycling, Inc.	1720 Magoffin Ave., El Paso	915-532-5643	Container and trailer service available
Environmental Center	800 South Piedras, El Paso	915-593-2784	
Bryan Drive-In Recycling Center	2202 Briarcrest Dr., Bryan, TX 77802	979-209-5675	
Plastics			
Discover Recycling	3845 Durazno Ave., El Paso	915-544-8414	drop off services available
National Recycling, Inc.	10400 Griffin Rd., Suite 101, Cooper City, FL, 33328	954-680-8802	buy, sell, offers waste stream solutions, top prices paid for paper, industrial plastics, metal, wood pallets, Customized recycling programs available
Twin Cities Recyclers Co., Inc.	3230 Durazno Ave., El Paso	915-543-3000	
United Plastics Services	12572 Darrington Rd., Suite 10, Horizon City, TX	915-851-9460	
Environmental Center	800 South Piedras, El Paso	915-593-2784	#1, #2
FDA Packaging	2355 Nevada St., Las Cruces, NM 88001	505-524-1997	#6
The UPS Stores	955 North Resler Dr., El Paso	915-842-8075	packing peanuts, cardboard, other packing material
The Alliance of Foam Packaging Recyclers	2128 Esprey Court, Crofton, MD 21114	800-944-8448	packing peanuts, other forms of packing material, foam
Bryan Drive-In Recycling Center	2202 Briarcrest Dr., Bryan, TX 77802	979-209-5675	#1, #2
Diversified Plastics Recycling	7340 State Road 245 East, North Lewisburg, OH 43060	937-747-3040	#1, #2, #4, #5, #6, #7

Company	Address	Phone	Notes
Propoly	Marlboro, NJ 07746	732-431-2200	#1, #2, #3, #4, #5, #6, #7
Wood			
Custom Crates and Pallets	1501 Westway Blvd., Canutillo, TX	915-892-2660	
Forproducts Corp	3624 East Gateway, El Paso	915-532-6710	pulpwood
Kastro's Wood Pallets, Inc.	13781 Davidson Blvd., El Paso	915-855-8011	
Twin Cities Recyclers Co., Inc.	3230 Durazno Ave., El Paso	915-543-3000	top prices paid for paper, industrial plastics, metal, wood pallets, Customized recycling programs available
WeRecycle, Inc.	500 South Broad St., Meriden, CT 06450	203-630-0344	carpet, ceiling tiles, pallets
Unknown Material			
Alpha Recycling	1820 East Mills Ave., El Paso	915-313-0333	drop off services available
Border Trading, Inc.	6940 Commerce Ave., El Paso	915-775-2546	drop off services available
Gandara's Recycling	10721 North Loop Dr., Socorro, TX	915-860-9596	drop off services available
Haro's Company, Inc.	11369 Alameda Ave., Socorro, TX	915-851-2028	drop off services available
Newell Recycling of El Paso	6800 Market Ave., El Paso	915-772-2728	
RG&M	11309 Alameda Ave., Socorro, TX	915-851-0995	drop off services available



US Army Corps
of Engineers®

New Construction Waste Management

Plans and Methods



US Army Corps
of Engineers

Army Policy on Waste Management

- 50% diversion (by weight) from landfill of construction and demolition waste for all Army projects.
- Waste type and quantities must be tracked, documented, and upward reported (SWAR)



US Army Corps
of Engineers

Contract Requirements for Waste Management

- 50% diversion (by weight) from landfill of construction and demolition waste
(01010, Section 6)
- A Waste Management Plan is required
(01355 Environmental Protection Plan)



US Army Corps
of Engineers®

Added Bonus

- The two easiest LEED credit points:
 - Automatically pick up LEED Credit MR 2.1
(Achieve 50% diversion of C&D waste from landfill)
 - With little effort, pick up LEED Credit MR 2.2
(Achieve 75% diversion of C&D waste from landfill)



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Management Plan

- Section 1 – Company Philosophy
- Section 2 – Project Waste Management Goals
- Section 3 – Communication Plan
- Section 4 – Expected Waste Streams, Disposal, and Handling



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How to Meet Army and USACE Waste Management Goals (WMP Section 2)

- Prevent – don't create/promote the waste in the first place
- Reduce – reduce the amount of waste generated for a given material/element
- Reuse – reuse scrap
- Recycle – send back to the company for remanufacturing or to a recycling facility



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Prevention

- Pre-fabrication/Pre-cut – manufacture to exact dimensions
- Accurately order the amount of material needed
- Measure carefully to avoid end cuts
- Store materials so they are not damaged



Reduce

- Order and ship in bulk where possible, avoiding excess packaging
- To encourage efficient use of materials, avoid paying installers on the basis of smaller units of measure (i.e. sq. ft. instead of sheet)
- GCs include similar recycling/diversion requirements in subcontracts (incl. Mgmt Plans, monitoring, and documentation).



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Reuse

- Save sizeable pieces for use elsewhere
 - carpet tiles piece from one edge may fit at the edge of another location
 - wallboard pieces can be used around doors and windows
 - lumber pieces can be used as spacers or blocking
 - Reuse PVC cut-offs for use as stubs for wall drains
- Optimum Value Engineering for wood construction



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Recycle

- Concrete/Asphalt/Masonry
- Drywall/Gypsum
- Metal
- Plastics
- Cardboard/paper/fibers
- Site/Landclearing Debris
(vegetation, soils)
- Wood
- Glass
- Carpet/Carpet
Tile
- Paints
- Floor Tile
- Acoustical Tile



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Ft. Bliss Resources

- Now
 - Cardboard/paper – Ft. Bliss can accept small quantities of paper and cardboard for recycling
- Future
 - Clean wood – Ft. Bliss owns a shredder, but no end use of shredded material is currently identified.
 - Soil –provide native fill material, accept native soil
 - Concrete/Aggregate/Asphalt/Masonry



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Site Handling

- Interior collection containers in centralized convenient locations for the trades.
- Exterior recycling containers clearly labeled and located in convenient locations for the trades.
- For pieces of materials to be reused – make sure the trades know where they can find these materials.



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Site Handling

- Keep garbage out of interior and recycling containers.
- Provide frequent and well labeled garbage containers, both interior and exterior.
- Training and Communication
- Whole Building Design Guide Construction Waste Management Resource Page (www.wbdg.org/design/cwm.php)



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Keeping Track

- Collect and organize documentation from receiving facilities (weight tickets, reports)
- Obtain/Estimate weights for those items not taken to a facility (elements returned to manufacture, wood taken to Ft. Bliss for mulching, etc.)
- Organize incoming information daily (DCQCRs, Excel spreadsheet)
- Keep quarterly (Dec, March, June, and Oct) and final (end of project) reports in mind
 - keeping track daily/regularly will make the final report easy.



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Government Oversight

- Plan-Do-Check-Act
- Review and approval of Waste Mgmt Plan prior to start of construction.
- QAR will check regularly interior and exterior collection bins to confirm appropriate use.
- QAR will ask regularly to see your tracking document/notebook/file.
- QAR will conduct periodic quick calculations to confirm that waste diversion is on track.
- Final waste report – diversion calculation must be verifiable (values easily matched to waste documentation)



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Questions?



US Army Corps
of Engineers®

Need Help?

Elizabeth Chien

206-764-6718

206-499-6119 cell

Elizabeth.A.Chien@usace.army.mil

Tom Napier

217-373-3497

Thomas.R.Napier@usace.army.mil

Tips to improve Reduce, Reuse, and Recycle

Material	Planning	On-Site
General	<ul style="list-style-type: none"> > Order products with recycled content. > To reduce waste and cost, accurately order in the amount of material needed. > Request suppliers to limit packaging. > Ask your vendors to take non-recyclable packaging back for reuse. > Use larger pieces elsewhere on the project (fillers and shorter pieces can be used to fill in). 	<ul style="list-style-type: none"> > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Store materials so they are not damaged. > Measure carefully to avoid end cuts.
Concrete	<ul style="list-style-type: none"> > Use concrete mix containing fly ash as part of the cementitious content of the concrete. > Request CMUs that contain recycled content from your supplier. 	<ul style="list-style-type: none"> > Separate and recycle asphalt and concrete. > Use reusable forms and supports to the maximum extent possible. > Reuse removed crushed concrete and asphalt as aggregate, sub-base material or fill. > Designate a location for excess concrete for use in paving, post footing anchorage, reinforcement, etc. > Store materials so that they are not damaged or discolored.
Drywall	<ul style="list-style-type: none"> > Order drywall with recycled content gypsum. > To reduce waste and cost, accurately order in the amount of material needed. > To encourage efficient use of materials, avoid paying installers on the basis of sheets of material installed (try using sq. ft. installed instead). 	<ul style="list-style-type: none"> > Store materials so they are not damaged. > Measure carefully to avoid end cuts. > Separate and recycle waste drywall. > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Save sizeable pieces of drywall for use around doors, windows, or built-ins, or for reuse on another job.
Electrical	<ul style="list-style-type: none"> > Order plumbing and other mechanical supplies with recycled content. > To reduce waste and cost, accurately order the amount of material needed. > Ask your vendors to reduce the amount of packaging (pallets, cardboard, plastic shrink wrap, metal bands) that is delivered to the job-site. > Ask your vendors to take non-recyclable packaging back for reuse. 	<ul style="list-style-type: none"> > Separate and recycle cardboard. > Separate and recycle metals and wire. > Separate and recycle plastics, such as PVC pipe. > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Store materials so they are not damaged. > Measure carefully to avoid end cuts.

Material	Planning	On-Site
Mechanical	<ul style="list-style-type: none"> > Order electrical, plumbing, and other mechanical supplies with recycled content. > To reduce waste and cost, accurately order the amount of material needed. > Ask your vendors to reduce the amount of packaging (pallets, cardboard, plastic shrink wrap, metal bands) that is delivered to the job-site. > Try precut and prefabricated components such as commercial heating and cooling ductwork or commercial sprinkler systems. > Ask your vendors to take non-recyclable packaging back for reuse. 	<ul style="list-style-type: none"> > Separate and recycle cardboard. > Separate and recycle plastics, such as PVC pipe. > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Store materials so they are not damaged. > Measure carefully to avoid end cuts.
Plumbing	<ul style="list-style-type: none"> > Order plumbing and other mechanical supplies with recycled content. > To reduce waste and cost, accurately order the amount of material needed. > Ask your vendors to reduce the amount of packaging (pallets, cardboard, plastic shrink wrap, metal bands) that is delivered to the job-site. > Ask your vendors to take non-recyclable packaging back for reuse. 	<ul style="list-style-type: none"> > Retain PVC cut-offs for use as stubs for wall drains. > Properly clean joints to prevent leaking. > Separate and recycle plastic, including PVC, if possible. > Separate and recycle cardboard. > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Store materials so they are not damaged. > Measure carefully to avoid end cuts.
Site/Landclearing	<ul style="list-style-type: none"> > shred vegetation for reuse in project landscaping. > design landscaping that reuses stone. 	<ul style="list-style-type: none"> > Separate and recycle asphalt and concrete/masonry. > Sell all marketable trees designated for removal. > Grind, chip, or shred other vegetation for mulching and composting. > Separate stumps, brush, and other wood waste for recycling. > Separate and recycle rebar and other metals. > Reuse removed crushed concrete and asphalt as aggregate, sub-base material or fill. > Provide on-site locations for as much excavated rock, soil, and vegetation as possible.

Material	Planning	On-Site
Wood	<ul style="list-style-type: none"> > To reduce waste and cost, accurately order the amount of material needed. > Use larger pieces elsewhere on the project (fillers and shorter pieces can be used to fill in). > Use building systems such as modular systems or foam-core panels that minimize the use of wood (systems that contain recycled wood chips or wood from small diameter secondary trees). 	<ul style="list-style-type: none"> > Segregate bits and ends for recycling from useable pieces to be used elsewhere. > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Store materials so they are not damaged. > Measure carefully to avoid end cuts. > Save sizeable pieces of wood in a central area for use as spacers, blocking, kindling, or for use on another job. > Designate a central area for end-cuts and damaged wood, making it convenient for carpenters to find and use scrap wood.

CONSTRUCTION / DEMOLITION SWARWeb PICKLIST		
MAJOR CATEGORY	SUB-CATEGORY	DEFINITION
Wood		
	Structural	TBD
	Finished	TBD
	Treated	TBD
	Other (C/D Wood)	TBD
Metal		
	Steel	TBD
	Copper	TBD
	Aluminum	TBD
	Mixed Metal	TBD
	Other (C/D Metal)	TBD
Masonry/Asphalt/Concrete/ Stone		
	Asphalt	TBD
	Brick	TBD
	Concrete	TBD
	Concrete Block Unit	TBD
	Stone	TBD
	Other (C/D Masonry/Asphalt)	TBD
Land Clearing Debris		
	Top Soil	TBD
	Sub Soil	TBD
	Petroleum-Contaminated Soil	TBD
	Non-Hazardous Lead-Contaminated Soil	TBD
	Vegetation/Timber (tree trunks & limbs)	TBD
	Crushed Stone/Base	TBD
	Other (C/D Land Clearing)	TBD
Other		
	Siding	TBD
	Composition Roof	TBD
	Insulation	TBD
	Doors/Windows/Stairs/Cabinets	TBD
	Ceiling Tile	TBD
	Gypsum/Plaster	TBD
	Plastic	TBD
	Glass	TBD
	Paper	TBD
	Other (C/D Other)	TBD
Additional Information		
Project Number		
Building Number(s)		
Reuse (Installation)		
Reuse (Off-Site)		
Recycle (Installation)		
Recycle (Off-Site)		
Bury (Installation)		
Bury (Off-Site)		
Dispose (Installation)		
Dispose (Off-Site)		
Other		
Source: Army Environmental Center, Charles Harris, (410) 436-1224, charles.harris2@us.army.mil		

Non- Hazardous Waste Management Plan

- a. Name of individuals on the Contractor's staff responsible for waste prevention and management.
- b. Specific actions that will be taken to reduce solid waste generation.
- c. Description of the specific approaches to be used in salvage/reuse/recycling/other diversion of the various materials generated, including the areas and equipment to be used for processing, sorting, and temporary storage of wastes.
- d. Identification of waste streams, including estimated types and quantities, of the waste to be generated.
- e. Identification of local and regional salvage/reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity.
- f. List of specific waste materials that will be salvaged for resale, salvaged for reuse, or recycled. Recycling facilities that will be used shall be identified. If a recycling facility (public or private) exists within a 50 mile radius of the project site, its use is required for all materials that facility accepts and that cannot be otherwise reused.
- g. Identification of materials that cannot be recycled/reused with an explanation or justification.
- h. Name of landfill and/or incinerator to be used for waste that are not diverted and the estimated costs for disposal.
- i. Anticipated net cost savings determined by subtracting Contractor program management costs and the cost of disposal from the revenue generated by sale of the materials and the incineration and/or landfill cost avoidance.

Hazardous Waste Management Plan (in addition to the requirements above)

- a. Types of wastes anticipated to be managed. This should include a discussion of processes which are generating the waste, the volumes anticipated, and the EPA/state waste codes associated with the waste (40 CFR 261, Subpart C and D).
- b. The regulatory status of the waste. In other words, whether the waste is subject to large quantity generator, small quantity generator, or conditionally exempt small quantity generator standards (40 CFR 262.34).
- c. The locations in which wastes will be accumulated will be discussed. This should discuss whether these are 90/180 day accumulation areas, satellite accumulation points,

or permitted storage areas. Preferably a map indicating the precise location should be included (40 CFR 262.34).

d. Inspection requirements. This should discuss what will be inspected, how often it will be inspected, who will conduct the inspection, what the inspection log will contain, and where the inspection records will be retained (40 CFR 262.34, 40 CFR 265.174, and 40 CFR 265.195).

e. Contingency Planning. Large quantity generators are required to have a contingency plan. Small quantity generators are required to post certain information (40 CFR 262.34 and 40 CFR 265 Subparts C and D).

f. Marking requirements. This should discuss what type of hazardous waste markings are to be utilized during accumulation (40 CFR 262.32).

g. Container types. Types of containers used to accumulate hazardous wastes should be identified. Compatibility with the waste being stored should be considered as well as whether the containers will meet packaging requirements for off-site transport (49 CFR 171.178).

h. Treatment requirements. How will wastes be treated to meet land disposal restrictions (40 CFR 268.40). If elementary neutralization is being performed to render waste non-hazardous, a statement should be included which indicates the activity is being performed under a permit exclusion (40 CFR 270.1(c)(2)(v)).

i. Disposal requirements. This should discuss whether wastes and/or treatment residues will be disposed in a Subtitle C, hazardous waste disposal facility or in a Subtitle D, nonhazardous waste facility.

j. Proposed treatment, storage, or disposal facilities (TSDFs). This should provide the name, address, telephone number, and EPA ID number of the TSDFs proposed to be utilized for the waste.

k. LDR forms. This should provide copies of the LDR forms from the proposed receiving facilities.

l. Recycling Facilities. This should discuss how the waste is to be salvaged, reused, and/or recycled. The name, address, and phone number of the facilities proposed for waste diversion should be provided.

Waste Management Plan Template

Section 1. Company Mission Statement/Company Philosophy and Organization

- a. Philosophy – basic company approach to waste management (i.e.: prevent, reduce, reuse, recycle, dispose)

Section 2. Project Waste Management Goal

- a. Contract required goal.
- b. Specific actions that will be taken to prevent or reduce solid waste generation. This includes identifying those companies providing material and equipment that are willing to accept the return of the resulting waste product after installation (floor tiles, ceiling/acoustical tiles, carpet tiles, etc.). Also identify material/companies willing to send large quantities of items in bulk, rather than individually wrapped (box of 200 door knobs instead of individually wrapped door knobs, pallets of stacked floor tiles instead of box of 12 floor tiles).
- c. Description of the specific approaches to be used in salvage/reuse/recycling/other diversion of the various materials generated, including the areas and equipment to be used for processing, sorting, and temporary storage of wastes.
- d. List of specific waste materials that will be salvaged for resale, salvaged for reuse, or recycled.
- e. Identification of materials that cannot be recycled/reused with an explanation or justification.

Generally, it's better (more resourceful) to reduce, than to reuse, and better to reuse than to recycle. However, it's not realistic to eliminate all waste, or salvage all materials not used on a particular job. Following is our Waste Management Plan.

Reduce means to prevent waste before it happens. You can reduce waste significantly on a construction project by “tweaking” your practices a bit; this means designing in less waste to begin with and minimizing damage and inefficient material use.

Reuse means to reuse materials as much as possible in your construction project. This includes:

- Materials removed during demolition
- Scrap generated on site
- Used materials or scraps from other jobs

Recycle means to separate recyclable materials from non-recyclable materials and supply them to a hauler or business so they can be processed and used to make new products. Another aspect of recycling is to Buy Recycled. Buying building materials with recycled content helps develop a market for the waste materials you recycle from your job site and “closes the loop.”

Section 3. Communication Plan

- a. Name of individuals on the Contractor's staff responsible for waste prevention and management.
- b. Specific actions that will be taken to communicate waste management issues throughout the project.
- c. Specific actions that will be taken to communicate the waste management plan and procedures to new employees/subs.
- d. Specify where containers will be placed, how they will be labeled, how waste management practices will be enforced (acceptable and unacceptable items and practices), and how this information will be communicated to the site staff.
- e. Specific procedures and details on how the waste information (what where, how much, who, how) will be documented, organized, and tracked. This includes all waste streams that are returned, salvaged, reused, recycled, and landfilled.
- f. Specific details on how the waste information will be reported to the government (routinely – weekly? monthly? quarterly? and at project closeout – final total details).

Section 4. Expected Waste Streams, Disposal, and Handling (non-hazardous only)

- a. Identification of waste stream (both diverted and landfilled.
- b. Quantity of each type of waste stream identified.
- c. Receiving facility or entity.
 - o Identification of local and regional salvage/reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity.
 - o Name of landfill and/or incinerator to be used for waste that are not diverted and the estimated costs for disposal.
- d. Specific site handling procedures.
- e. Identification of transportation method or company.

Example Table Identifying Possible Waste Streams, Quantity, Disposal/Diversion Method, and Handling Procedures

Material	Qty.	Disposal Method (where applicable)	Handling and Transportation Procedure
<i><u>New Construction</u></i>			
Concrete	15 cy		Break up concrete onsite with an excavator, load in trucks and haul to Echo Park Recycle
Forming Boards	6 tons	Reused as many times as possible then recycled to Renu Recycling	Stack next to supply of new form boards for reuse. Recycle clean unusable form in "clean wood" recycling dumpster
Clean Wood Scrap	3 tons	Scraps reused for form work, fire-breaks, etc., then recycled by Renu Recycling	Stack reusable pieces next to dumpster for Reuse. Separate unusable clean wood into "clean wood" recycling dumpster (including wood pallets)
CMUs	75 yds	Henson Masonry to recycle and submit report to recycling coordinator	Will request CMUs that contain recycled Content from supplier
Scrap Metal	5 tons	Renu Recycling Service	Deposit all metals in "metal" dumpster
Acoustical Tile			
Floor Tile			
Carpet Tile			
Gypsum/Wall board			
Cardboard			
Plastic			
Etc.			

Section 5. Hazardous Waste Management Plan (in addition to the requirements above)

Be sure to coordinate Hazmat procedures with Tom Curcio (FL DPW) 253-966-6458.

- a. Types of wastes anticipated to be managed. This should include a discussion of processes which are generating the waste, the volumes anticipated, and the EPA/state waste codes associated with the waste (40 CFR 261, Subpart C and D).
- b. The regulatory status of the waste. In other words, whether the waste is subject to large quantity generator, small quantity generator, or conditionally exempt small quantity generator standards (40 CFR 262.34).
- c. The locations in which wastes will be accumulated will be discussed. This should discuss whether these are 90/180 day accumulation areas, satellite accumulation points, or permitted storage areas. Preferably a map indicating the precise location should be included (40 CFR 262.34).
- d. Inspection requirements. This should discuss what will be inspected, how often it will be inspected, who will conduct the inspection, what the inspection log will contain, and where the inspection records will be retained (40 CFR 262.34, 40 CFR 265.174, and 40 CFR 265.195).
- e. Contingency Planning. Large quantity generators are required to have a contingency plan. Small quantity generators are required to post certain information (40 CFR 262.34 and 40 CFR 265 Subparts C and D).
- f. Marking requirements. This should discuss what type of hazardous waste markings are to be utilized during accumulation (40 CFR 262.32).
- g. Container types. Types of containers used to accumulate hazardous wastes should be identified. Compatibility with the waste being stored should be considered as well as whether the containers will meet packaging requirements for off-site transport (49 CFR 171.178).
- h. Treatment requirements. How will wastes be treated to meet land disposal restrictions (40 CFR 268.40). If elementary neutralization is being performed to render waste non-hazardous, as statement should be included which indicates the activity is being performed under a permit exclusion (40 CFR 270.1(c)(2)(v)).
- i. Disposal requirements. This should discuss whether wastes and/or treatment residues will be disposed in a Subtitle C, hazardous waste disposal facility or in a Subtitle D, nonhazardous waste facility.
- j. Proposed treatment, storage, or disposal facilities (TSDFs). This should provide the name, address, telephone number, and EPA ID number of the TSDFs proposed to be utilized for the waste.
- k. LDR forms, if required. This should provide copies of the LDR forms from the proposed receiving facilities.

<u>Hazardous Material</u>			
ACM	1500 cyds	XYZ Landfill	Abatement by XXX Abatement Co., transported to landfill by XXX Transport
PCB Ballasts			Stored in drums provided by Ft. Lewis hazmat office at location building XYZ
Flourescent Lamps			
Mercury Switches			
Ozone-Depleting Substances			
Lo-level Rad elements			
Etc.			
Etc.			

APPENDIX DD

Water Quality

Section: Appendix DD
Definitions

Action Level (AL) - the concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

Highest Detected - maximum laboratory analytical result for a contaminant; this value is evaluated against an MCL or AL to determine compliance.

Maximum Contaminant Level (MCL) - the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Maximum Contaminant Level Goal (MCLG) - the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Maximum Residual Disinfection Level (MRDL) - the highest level of disinfection allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfection Level Goal (MRDLG) - the level of drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of use of disinfectants to control microbial contamination.

ABBREVIATIONS

NTU - nephelometric turbidity unit; a measure of turbidity in water.

pCi/l - picocuries per liter; a measure of radioactivity in water.

ppb - parts per billion; a unit of measure equivalent to a single penny in \$10,000,000 or another example is one packet of artificial sweetener sprinkled into an Olympic-size swimming pool full of water.

ppm - parts per million; a unit of measure equivalent to a single penny in \$10,000.

Range - the range of the highest and lowest analytical values of a reported contaminant.

Treatment Technique - a required process intended to reduce the level of a contaminant in drinking water. disinfection.

Other Substances

Unregulated Initial Distribution System Evaluation for Disinfection Byproducts: Waived or Not Yet Sampled.

Turbidity: Not Required

Total Coliform: Reported Monthly Testing Found No Coliform Bacteria

Fecal Coliform: Reported Monthly Tests Found No Fecal Coliform Bacteria.

Organic chemical contaminants: Testing Waived, Not Reported or None Detected

Required Additional Health Information for Lead

“If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. This water supply is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at <http://www.epa.gov/safewater/lead>.”

RESULTS TABLES — DETECTED SUBSTANCES

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The tables that follows list all of the federally regulated or monitored constituents which have been found in your drinking water. The U.S. EPA requires water systems to test up to 97 constituents.

Inorganic Contaminants

Year	Contaminant	Average Level	Minimum Level	Maximum Level	MCL	MCLG	Unit of Measure	Source of Contaminant
2008	Arsenic	4	3	5	10	0	ppb	Erosion of natural deposits
2008	Barium	.077	0.054	0.1	2	2	ppm	Erosion of natural deposits
2008	Chromium	3.6	1.6	5.7	100	100	ppb	Erosion of natural deposits
2008	Fluoride	0.91	0.8	1.02	4	4	ppm	Erosion of natural deposits; water additive which promotes strong teeth
2009	Nitrate	3.31	2.06	4.56	10	10	ppm	Fertilizer use runoff; septic tank leaching, sewage, erosion from natural deposits.
2005	Gross alpha	3.15	2.9	3.4	15	0	pCi/L	Erosion of natural deposits
2005	Gross beta emitters	8.5	7.4-9.6		50	0	pCi/L	Decay of natural and man-made deposits

Secondary and Other Constituents Not Regulated (No associated adverse health effects)

Year	Constituent	Average Level	Minimum Levels	Maximum Level	Secondary Limit	Unit of Measure	Likely Source of Constituent
2008	Aluminum	0.013	0.011	0.014	0.05	ppm	Abundant naturally occurring element.
2008	Bicarbonate	143	126	160	NA	ppm	Corrosion of carbonate rocks such as limestone.
2008	Calcium	42.2	22.7	61.7	NA	ppm	Abundant naturally occurring element.
2008	Chloride	89	70	109	300	ppm	Abundant naturally occurring element
2008	Hardness as Ca/Mg	169	87	251	NA	ppm	Naturally occurring calcium and magnesium.
2008	Magnesium	15.5	7.4	23.6	NA	ppm	Abundant naturally occurring element.
2008	Nickel	0.001	0	0.002	NA	ppm	Erosion of natural deposits
2008	pH	8.1	8	8.1	>7.0	units	Measure of corrosivity of water
2008	Sodium	80	72	88	NA	ppm	Erosion of natural deposits.
2008	Sulfate	76	60	93	300	ppm	Naturally occurring, industrial by-product
2008	Total Alkalinity as CaCO3	143	126	160	NA	ppm	Natural occurring soluble mineral salts
2008	Total Dissolved Solids	454	377	531	1000	ppm	Total dissolved mineral constituents in water
2008	Zinc	0.006	0.005	0.006	5	ppm	Moderately abundant naturally occurring element; used in metal industry.

Maximum Residual Disinfectant Level

Year	Disinfectant	Average Level	Minimum Level	Maximum Level	MRDL	MRDLG	Unit of Measure	Source of Disinfectant
2009	Chlorine Residual, Free	0.78	0.2	3	4	4	ppm	Disinfectant used to control microbes

Disinfection Byproducts

Year	Contaminant	Average Level	Minimum Level	Maximum Level	MCL	Unit of Measure	Source of Contaminant
2009	Total Haloacetic Acids	21.6	< 6.0	33.9	60	ppb	Byproduct of drinking water disinfection
2009	Total Trihalomethanes	55.2	< 4.0	92 ⁽¹⁾	80	ppb	Byproduct of drinking water disinfection

(1) The system average meets the current drinking water requirements

Unregulated Contaminants

Year	Contaminant	Average Level	Minimum Level	Maximum Level	Unit of Measure	Source of Contaminant
2009	Bromoform	1.9	1.9	1.9	ppb	Byproduct of drinking water disinfection
2009	Dibromochloromethane	1.2	1.2	1.2	ppb	Byproduct of drinking water disinfection

Lead and Copper

Year	Contaminant	90th Percentile	Number of Sites Exceeding Action Level	Action Level	Unit of Measure	Source of Contaminant
2009	Lead	7.1	0	15	ppb	Corrosion of household plumbing systems; erosion of natural deposits
2009	Copper	0.773	0	1.3	ppm	Corrosion of household plumbing systems; erosion of natural deposits, leaching from wood preservatives

Tuesday, October 19, 2010



Texas Department of Health

BUREAU OF LABORATORIES
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CONFIDENTIAL LABORATORY REPORT WATER ANALYSIS REPORT METALS -

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1100 WEST 49TH STREET

AUSTIN, TEXAS 78756-3194

(512) 458-7318

Submitter Identification Number: 0710078

FORT BLISS BIGGS ARMY AIRFIELD
-SDWA PROGRAM MANAGER
ATZC-DOE BLDG 622
FORT BLISS, TX 79916

Laboratory Number: EP216501

Sample Type:

Sample Source:

Entry Points: 001

Collector Remarks:

Date Collected: 10/17/2002

Date Received: 10/18/2002

Date Reported: 11/12/2002

Constituent Name	Result	Units	+/-
Aluminum	<	0.0200 mg/l	
Arsenic	<	0.0068 mg/l	
Barium	<	0.0492 mg/l	
Cadmium	<	0.0010 mg/l	
Calcium	<	18.80 mg/l	
Chromium	<	0.0100 mg/l	
Copper	<	0.0809 mg/l	
Iron	<	0.011 mg/l	
Lead	<	0.0054 mg/l	
Magnesium	<	6.20 mg/l	
Manganese	<	0.0020 mg/l	
Mercury	<	0.0004 mg/l	
Nickel	<	0.0010 mg/l	
Selenium	<	0.0032 mg/l	
Silver	<	0.0100 mg/l	
Sodium	<	110.00 mg/l	
Antimony	<	0.0030 mg/l	
Beryllium	<	0.0010 mg/l	
Thallium	<	0.0010 mg/l	
Zinc	<	0.0321 mg/l	
Total Hardness as CaCO3		72.4 mg/l	



Texas Department of Health

BUREAU OF LABORATORIES
CLIA #45D0660644

CONFIDENTIAL LABORATORY REPORT WATER ANALYSIS REPORT MINERALS

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1100 WEST 49TH STREET

AUSTIN, TEXAS 78756-3194

(512) 458-7318

Submitter Identification Number: 0710078

FORT BLISS BIGGS ARMY AIRFIELD

ATZC-DOE BLDG 622
EL PASO, TX 79916

Laboratory Number: EP216498
Sample Type:
Sample Source:
Entry Points: 001
Collector Remarks:

Date Collected: 10/17/2002
Date Received: 10/18/2002
Date Reported: 12/19/2002

Constituent Name	Result	Units	+/-
Chloride	70	mg/l	
Fluoride	0.9	mg/l	
Nitrate	1.40	mg/l	
Sulfate	66	mg/l	
pH	7.1		
Dil. Conduct (umhos/cm)	720		
Tot. Alka. as CaCO3	134	mg/l	
Bicarbonate	163	mg/l	
Carbonate	0	mg/l	
Dissolved solids	353	mg/l	
P. Alkalinity as CaCO3	0	mg/l	

Tuesday, October 19, 2010

Texas Department of Health

BUREAU OF LABORATORIES
 CLIA #45D0660644

CONFIDENTIAL LABORATORY REPORT WATER ANALYSIS REPORT MINERALS

Submitter Identification Number: 0710078

FORT BLISS BIGGS ARMY AIRFIELD

ATZC-DOE BLDG 622
 FORT BLISS, TX 79916-0000

Laboratory Number: EP411262
 Sample Type:
 Sample Source: CMO 1C
 Entry Points: 001
 Collector Remarks: NITRATE

Date Collected: 05/13/2004
 Date Received: 05/14/2004
 Date Reported: 05/19/2004

Constituent Name

Nitrate

Nitrite

NOT TESTED - OTHER

Result

Units

1.56 mg/l

Tuesday, October 19, 2010

+/-

1100 W. 49th Street

Austin, TX 78756

Texas Department of Health Trihalomethanes by GC-ELCD

Contact: Gary Fest

(512)458-7552

Submitter ID: 0710078
TDH Lab ID: EP04-11271
Method: EPA 502.2 Rev. 2.1 (THM)
Data File: 05170019.D
QC File: D:\HPCHEM\1\DATA\IO01G0517
Sample Type: Water

Date Collected: 05/13/2004
Date Prepared: 05/17/2004
Date Analyzed: 05/17/2004 8:50
Analyst: M. Gerlach
Dilution Factor: 1
Concentration Units: µg/l

Compound:**Result:**

Chloroform
Bromodichloromethane
Dibromochloromethane
Bromoform
Total THM's

< 2.0
< 2.0
< 2.0
< 2.0
< 8.0

COMMENTS:Approval: *Hossein Hajipour*

Tuesday, October 19, 2010

MAY 19 2004

**Texas Department of Health
Haloacetic Acids GC Results**

Contact: Gary Fest

(512) 458-7552

Submitter Sample Number 0710078
TDH Sample Name EP4-11294
Method 552.2
Data File Name 0519023.D
QC File C:\MSDCHEM\2\DATA\O18P0519\
Sample Type Water

Date Collected 5/13/2004
Date Extracted 5/18/2004
Date Analyzed 5/20/2004 4:17
Analyst M. Kabay
Dilution Factor 1
Concentration Units µg/L

Regulated Compounds:**Result:**

Monochloroacetic acid	<2.0
Dichloroacetic acid	<1.0
Trichloroacetic acid	<1.0
Monobromoacetic acid	<1.0
Dibromoacetic acid	<1.0
Total:	<6.0

Monitor Compounds:

Bromochloroacetic acid	<1.0
Dalapon	<1.0

Comments:

Approval: 

Tuesday, October 19, 2010

MAY 21 2004



Texas Department of Health

BUREAU OF LABORATORIES
CLIA #45D0660644

CONFIDENTIAL LABORATORY REPORT WATER ANALYSIS REPORT RADIOCHEMICALS

W912DY-10-R-0018

Page 1508 of 1982

1100 WEST 49TH STREET

AUSTIN, TEXAS 78756-3194

(512) 458-7318

Submitter Identification Number: 0710078

FORT BLISS BIGGS ARMY AIRFIELD

ATZC-DOE BLDG 622
EL PASO, TX 79916

Laboratory Number: EP216503

Sample Type:

Sample Source:

Entry Points: 001

Collector Remarks:

Date Collected: 10/17/2002

Date Received: 10/18/2002

Date Reported: 04/01/2003

Constituent Name	Result	Units	+/-
Radium 226	< 0.2	pCi/l	
Radium 228	1.5	pCi/l	
Gross Beta	9.3	pCi/l	0.5
Gross Alpha Particle Activity	4.6	pCi/l	1.3
			1.4

Tuesday, October 19, 2010

APPENDIX EE

CorrShield NT 402

**GE Betz**

GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
Business telephone: (215) 355-3300

Material Safety Data Sheet

Issue Date: 01-SEP-2004

EMERGENCY TELEPHONE (Health/Accident): (800) 877-1940

1 PRODUCT IDENTIFICATION

PRODUCT NAME:

CORRSHIELD NT402

PRODUCT APPLICATION AREA:

CORROSION INHIBITOR.

2 COMPOSITION / INFORMATION ON INGREDIENTS

Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this MSDS for our assessment of the potential hazards of this formulation.

HAZARDOUS INGREDIENTS:

CAS#	CHEMICAL NAME
7632-00-0	SODIUM NITRITE Oxidizer; toxic (by ingestion); potential blood toxin
12179-04-3	BORIC ACID,DISODIUM SALT,PENTAHYDRATE Irritant (abraded skin); slight irritant (respiratory)

No component is considered to be a carcinogen by the National Toxicology Program, the International Agency for Research on Cancer, or the Occupational Safety and Health Administration at OSHA thresholds for carcinogens.

3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW**WARNING**

May cause moderate irritation to the skin. Severe irritant to the eyes. Mists/aerosols cause irritation to the upper respiratory tract.

DOT hazard: Toxic Liquid, RQ
Emergency Response Guide #151
Odor: Slight; Appearance: Yellow, Liquid

Fire fighters should wear positive pressure self-contained breathing apparatus(full face-piece type). Proper fire-extinguishing media:
Flood with water. Use of CO2 or foam may not be effective.

POTENTIAL HEALTH EFFECTS

ACUTE SKIN EFFECTS:

Primary route of exposure; May cause moderate irritation to the skin.

ACUTE EYE EFFECTS:

Severe irritant to the eyes.

ACUTE RESPIRATORY EFFECTS:

Mists/aerosols cause irritation to the upper respiratory tract.

INGESTION EFFECTS:

Toxic;
May cause gastrointestinal irritation with possible nausea, vomiting, headache, dizziness, unconsciousness and injury to the kidneys and liver.

TARGET ORGANS:

Prolonged or repeated exposures may cause CNS depression and/or toxicity to the liver, kidney, and blood system.

MEDICAL CONDITIONS AGGRAVATED:

Not known.

SYMPTOMS OF EXPOSURE:

May cause redness or itching of skin.

4 FIRST AID MEASURES

SKIN CONTACT:

Wash thoroughly with soap and water. Remove contaminated clothing. Thoroughly wash clothing before reuse. Get medical attention if irritation develops or persists.

EYE CONTACT:

Remove contact lenses. Hold eyelids apart. Immediately flush eyes with plenty of low-pressure water for at least 15 minutes. Get immediate medical attention.

INHALATION:

If nasal, throat or lung irritation develops - remove to fresh air and get medical attention.

INGESTION:

Do not feed anything by mouth to an unconscious or convulsive victim. Dilute contents of stomach. Induce vomiting by one of the standard methods. Immediately contact a physician.

NOTES TO PHYSICIANS:

No special instructions

5 FIRE FIGHTING MEASURES

FIRE FIGHTING INSTRUCTIONS:

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type).

EXTINGUISHING MEDIA:

Flood with water. Use of CO2 or foam may not be effective.

HAZARDOUS DECOMPOSITION PRODUCTS:

Thermal decomposition (destructive fires) yields elemental oxides.

FLASH POINT:

> 200F > 93C P-M(CC)

MISCELLANEOUS:

Toxic Liquid, RQ

UN3287;Emergency Response Guide #151

6 ACCIDENTAL RELEASE MEASURES

PROTECTION AND SPILL CONTAINMENT:

Ventilate area. Use specified protective equipment. Contain and absorb on absorbent material. Place in waste disposal container. Flush area with water. Wet area may be slippery. Spread sand/grit.

DISPOSAL INSTRUCTIONS:

Water contaminated with this product may be sent to a sanitary sewer treatment facility, in accordance with any local agreement, a permitted waste treatment facility or discharged under a permit. Product as is - Incinerate or land dispose in an approved landfill.

7 HANDLING & STORAGE

HANDLING:

Contains an oxidizer. Avoid all contact with reducing agents, oils, greases, organics and acids. Do not allow to dry.

STORAGE:

Keep containers closed when not in use. Protect from freezing.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS**CHEMICAL NAME****SODIUM NITRITE**

PEL (OSHA): NOT DETERMINED

TLV (ACGIH): NOT DETERMINED

BORIC ACID, DISODIUM SALT, PENTAHYDRATE

PEL (OSHA): NOT DETERMINED

TLV (ACGIH): 1 MG/M3

ENGINEERING CONTROLS:

Adequate ventilation to maintain air contaminants below exposure limits.

PERSONAL PROTECTIVE EQUIPMENT:

Use protective equipment in accordance with 29CFR 1910 Subpart I

RESPIRATORY PROTECTION:

A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSHA'S 29 CFR 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE. USE AIR PURIFYING RESPIRATORS WITHIN USE LIMITATIONS ASSOCIATED WITH THE EQUIPMENT OR ELSE USE SUPPLIED AIR-RESPIRATORS. If air-purifying respirator use is appropriate, use a respirator with dust/mist filters.

SKIN PROTECTION:

rubber gloves-- Wash off after each use. Replace as necessary.

EYE PROTECTION:

splash proof chemical goggles

9 PHYSICAL & CHEMICAL PROPERTIES

Specific Grav.(70F,21C)	1.250	Vapor Pressure (mmHG)	~ 18.0
Freeze Point (F)	< < 0	Vapor Density (air=1)	< 1.00
Freeze Point (C)	< -18		
Viscosity(cps 70F,21C)	12	% Solubility (water)	100.0

Odor	Slight
Appearance	Yellow
Physical State	Liquid
Flash Point	P-M(CC) > 200F > 93C
pH As Is (approx.)	11.6
Evaporation Rate (Ether=1)	< 1.00

NA = not applicable ND = not determined

10 STABILITY & REACTIVITY

STABILITY:

Stable under normal storage conditions.

HAZARDOUS POLYMERIZATION:

Will not occur.

INCOMPATIBILITIES:

May react with strong oxidizers.

DECOMPOSITION PRODUCTS:

Thermal decomposition (destructive fires) yields elemental oxides.

INTERNAL PUMPOUT/CLEANOUT CATEGORIES:

"B"

11 TOXICOLOGICAL INFORMATION

Oral LD50 RAT:	~275 mg/kg
NOTE - Estimated value	
Dermal LD50 RABBIT:	>5,000 mg/kg
NOTE - Estimated value	

12 ECOLOGICAL INFORMATION

AQUATIC TOXICOLOGY

Ceriodaphnia 48 Hour Static Renewal Bioassay
LC50= 61; No Effect Level= 15.6 mg/L
Daphnia magna 48 Hour Static Renewal Bioassay pH of test solutions was adjusted to a level of 6-9.
LC50= 100; No Effect Level= 38 mg/L
Fathead Minnow 96 Hour Static Renewal Bioassay
LC50= 1072; No Effect Level= 500 mg/L
Rainbow Trout 96 Hour Static Acute Bioassay
LC50= 180; No Effect Level= 100 mg/L

BIODEGRADATION

BOD-28 (mg/g): 1
BOD-5 (mg/g): 0
COD (mg/g): 79
TOC (mg/g): 4

13 DISPOSAL CONSIDERATIONS

If this undiluted product is discarded as a waste, the US RCRA hazardous waste identification number is :
Not applicable.

Please be advised; however, that state and local requirements for waste disposal may be more restrictive or otherwise different from federal regulations. Consult state and local regulations regarding the proper disposal of this material.

14 TRANSPORT INFORMATION

DOT HAZARD: Toxic Liquid, RQ
UN / NA NUMBER: UN3287
DOT EMERGENCY RESPONSE GUIDE #: 151

15 REGULATORY INFORMATION

TSCA:

All components of this product are listed in the TSCA inventory.

CERCLA AND/OR SARA REPORTABLE QUANTITY (RQ):

32 gallons due to SODIUM NITRITE;

SARA SECTION 312 HAZARD CLASS:

Immediate(acute);Delayed(Chronic)

SARA SECTION 302 CHEMICALS:

No regulated constituent present at OSHA thresholds

SARA SECTION 313 CHEMICALS:

CAS#	CHEMICAL NAME	RANGE
7632-00-0	SODIUM NITRITE	21.0-30.0%

CALIFORNIA REGULATORY INFORMATION

CALIFORNIA SAFE DRINKING WATER AND TOXIC

ENFORCEMENT ACT (PROPOSITION 65) CHEMICALS PRESENT:

No regulated constituents present

MICHIGAN REGULATORY INFORMATION

No regulated constituent present at OSHA thresholds

16 OTHER INFORMATION

NFPA/HMIS

CODE TRANSLATION

Health	2	Moderate Hazard
Fire	0	Minimal Hazard
Reactivity	0	Minimal Hazard
Special	NONE	No special Hazard
(1) Protective Equipment	B	Goggles,Gloves

(1) refer to section 8 of MSDS for additional protective equipment recommendations.

CHANGE LOG

	EFFECTIVE DATE -----	REVISIONS TO SECTION: -----	SUPERCEDES -----
MSDS status:	13-FEB-1997		** NEW **
	23-JUN-1997		13-FEB-1997
	16-NOV-2001	15	23-JUN-1997
	09-OCT-2002	12	16-NOV-2001
	10-OCT-2002	4,16	09-OCT-2002
	26-NOV-2002	12	10-OCT-2002
	01-SEP-2004	3,5,14	26-NOV-2002

APPENDIX FF

FORT BLISS PERMITS

1) ACCESS CONTROL POLICY

2) FIRE PREVENTION CONTRACTOR'S
GUIDE

3) STANDARD EXCAVATION REQUEST



DEPARTMENT OF THE ARMY
 US ARMY INSTALLATION MANAGEMENT COMMAND
 HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT BLISS
 1 PERSHING ROAD
 FORT BLISS, TX 79916-3803

December 27, 2006

REPLY TO
ATTENTION OF:

Office of the Garrison Commander

Dear Fort Bliss Business Partner:

Fort Bliss continues to take steps to ensure the safety of our personnel, facilities, vendors, suppliers, contractors, service providers and visitors on our post. Effective February 1, 2007, Fort Bliss is instituting a new standardized entry protocol called the *RAPIDGate*™ Program for all new and existing vendors, suppliers, contractors and service providers (companies) who require routine access to Fort Bliss. The *RAPIDGate* Program is one of several steps Fort Bliss is undertaking to comply with Homeland Security Presidential Directive 12 (HSPD-12). The *RAPIDGate* Program, provided by Eid Passport, Inc., will provide a standardized background check, an identification badge and entry procedure that improves security while at the same time significantly speeding up entry for participating companies.

Companies participating in the *RAPIDGate* Program will be able to enter Fort Bliss through any of the 8 currently open gates (Cassidy, Sheridan, Marshal, Chaffee, Remagan, Robert E. Lee, Jeb Stuart South, and Pershing) without having to stop and obtain a day pass. Of course, due to the size constriction of some vehicles, larger vehicles in the size of semi-truck or larger will be only allowed to enter through the Cassidy, Sheridan, Chaffee, and Robert E. Lee access points. Companies can enroll in the *RAPIDGate* Program by calling 1-877 *RAPIDGATE* (1-877-727-4342). Once enrolled, employees can register at the self-service Registration Stations located at the Chaffee Gate, Bldg. 505 (Vehicle Registration) or the BAAF Main Gate. Based on the information collected at the self-service Registration Station, the *RAPIDGate* Program runs a 10-year felony background screen, other criminal screens, and validates the social security number. The *RAPIDGate* Program also verifies that the individual is either a U.S. Citizen or is legally eligible to work in the United States. Upon passing the screening process, participants will be issued a personalized *RAPIDGate* identification badge that when verified by a security officer will allow the participant to enter Fort Bliss without having to sign in for a day pass. The *RAPIDGate* identification badge will be valid for a period of twelve (12) months. Your company will be given an opportunity at the end of the 12 month period to renew enrollment in the program. Fort Bliss will no longer accept background checks from other sources beginning February 1, 2007.

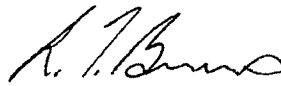
Companies that chose not to participate in the *RAPIDGate* Program will be allowed access only through the Fort Bliss Chaffee (Commercial) Gate where, before entering the installation, these personnel will be required to obtain a day pass at the Chaffee Pass Office. To receive the one day pass, you will need to park your vehicle and have all occupants enter the gate pass office to sign in, individually, for the day pass. All vehicle occupants must be prepared to provide a government issued photo ID, and the driver of the vehicle will be required to provide proof of

vehicle registration, proof of insurance, and a state issued drivers license. Extended Passes will no longer be available beginning February 1, 2007 while currently issued extended passes will be honored until their expiration date.

The *RAPIDGate* Program not only saves you time, but also increases the safety and security for Fort Bliss and all personnel who work on the base. We encourage your participation in the *RAPIDGate* Program. Please note, *RAPIDGate* participants are still subject to random inspections.

To enroll, please follow the guidelines on the attached document (*RAPIDGate* Program Enrollment Information). Questions about the Fort Bliss *RAPIDGate* program should be addressed to info@rapidgate.com with the subject line RE: *RAPIDGate* Program.

Sincerely,

A handwritten signature in black ink, appearing to read "R. T. Burns", is positioned above the printed name.

Robert T. Burns
Colonel, US Army
Commanding

Forms of Acceptable Identification

List A – One Needed

- U.S. Passport (unexpired or expired)
- Certificate of U.S. Citizenship (Form N-560 or N-561)
- Certificate of Naturalization (Form N-550 or N-570)
- Unexpired foreign passport, with I-551 stamp or attached Form I-94 indicating unexpired employment authorization
- Permanent Resident Card or Alien Registration Receipt Card with photograph (Form I 151 or I-551)
- Unexpired Temporary Resident Card (form I-688)
- Unexpired Employment Authorization Card (Form I-688A)
- Unexpired Reentry Permit (Form I-327)
- Unexpired Refugee Travel Document (Form I-571)
- Unexpired Employment Authorization Document issued by DHS that contains a photograph (Form I-688B)

List B – Two Needed

- Driver's license or ID card issued by a state
- ID Card issued by federal, state or local government agencies or entities
- School ID card with a photograph
- Voter's registration card
- U.S. Military card or draft record
- Military Dependent's ID card
- U.S. Coast Guard Merchant Mariner Card
- Native American tribal document
- Driver's license issued by a Canadian government authority
- U.S. Social Security card issued by the Social Security Administration
- Certification of Birth Abroad issued by the Department of State (Form FS-545 or Form DS-1350)
- Original or certified copy of a birth certificate issued by a state, county, municipal authority or outlying possession of the United States bearing an official seal
- Native American tribal document
- U.S. Citizen ID Card (Form I-197)
- ID Card for use of Resident Citizen in the United States (Form I-179)
- Unexpired employment authorization document issued by DHS (other than those listed under List A)

RAPIDGate Program Enrollment Information

Enroll your company by calling Eid Passport at 1-877-*RAPIDGATE* (1-877-727-4342) and provide a Fort Bliss sponsor point of contact that includes a name, phone number, and e-mail address. Once your request is received, final authorization to participate in the *RAPIDGate* Program will be granted by the Fort Bliss Office of the Provost Marshal.

Once your company has been approved for enrollment and paid the enrollment fee, instruct your employees who need access to Fort Bliss to register for the *RAPIDGate* Program using the self-service Registration Station located within the Chaffee Gate Pass Office, Bldg. 505 (Vehicle Registration Office) or the BAAF Main Gate Pass Office. Each employee should be ready to provide your company's *RAPIDGate* company code, his or her address, phone number, date of birth, and Social Security number for proof of identification and background screening. The Registration Station will capture the employees photograph and fingerprints for identity verification and badging during the application process.

Once your company has approved each employee for participation, and paid the registration fee, the employee will undergo a background screen. Upon passing the screen, your company will be notified to send the employee to pickup their personalized *RAPIDGate* Badge at the Fort Bliss Vehicle Registration Office located within bldg. 505. The employee will be required to show identification at the time of badge pickup. The employees can show one form of identification from List A, or two forms of identification from List B. Please see last page for listing.

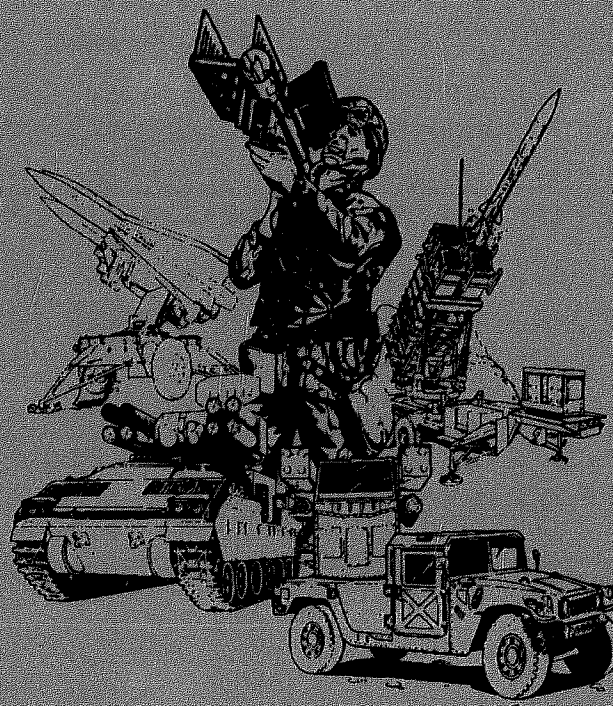
Once a *RAPIDGate* Badge is issued, employees will be required to present their Badge to gain entry to Fort Bliss, and must wear and display the Badge at all times while on the premises. Questions about the Fort Bliss *RAPIDGate* program should be addressed to info@rapidgate.com with the subject line RE: *RAPIDGate* Program.

Continuation -

Due to ongoing construction on Fort Bliss, Biggs AAF, and WBAMC several temporary access gates have been constructed to facilitate entry onto the cantonments. The additional access gates are not included within the Letter To Vendors due to their temp status and their construction after the letter was issued. The additional access gates, located on Biggs AAF, are Global Reach ACP, General Harmon ACP and IBCT ACP. These listed temp access gates will follow the same access control procedures as outlined for all members of the Rapid Gate system. Please be advised that, due to their temporary construction status, care should be taken when attempting access with larger than standard sized vehicles. These temp access gates are constructed with 10' to 12' in width paved traffic lanes and an overhead clearance of no less than 14.5'. Traffic speed limits upon approaching, entering, and leaving the temp access gates are listed as 15mph.

FEB 1, 2009

Fort Bliss Fire Department



Fire Prevention Contractors Guide

FIRE PREVENTION CONSTRUCTION GUIDE

Fires during construction, alteration, or demolition operations are an ever-present threat. The fire potential is inherently greater during these operations than in the completed structure due to previous occupancy hazards and the presence of large quantities of combustible materials and debris, together with ignition sources such as temporary heating devices, cutting/ welding/ soldering operations, open fires and smoking. The threat of arson is also greater during construction and demolition operations due to the availability of combustible materials on site and open access.

Fires during construction, alteration, or demolition operations can be eliminated or controlled through the early planning, scheduling and implementation of fire prevention measures, fire protection systems, rapid communications and on-site security. An overall construction or demolition fire safety program shall be developed; essential items to be emphasized include:

- a. Good housekeeping
- b. On-site security
- c. Installation of new fire protection systems as construction progresses.
- d. Preservation of existing systems during demolition
- e. Organization and training of on-site fire brigade
- f. A pre-fire plan developed with the fire department.
- g. Rapid communication availability
- h. Consideration of special hazards in and around site.
- i. Protection of existing structures and equipment from exposure fires resulting from construction, alterations and demolition operations.
- j. Prohibiting employees from smoking at the job site or establishing designated smoking areas.

A fire safety program shall be included in all construction, alteration or demolition contracts. It is the responsibility of the Fire Department to administer and enforce this program. Contractors need to refer to NFPA 1, Uniform Fire Code, and Chapter 41 for Hot Work Permits. The standards for safeguarding construction, alteration and demolition operations are found in NFPA 241. It is the contractors' responsibility to provide extinguishers at the job site. The suitability, distribution and maintenance of extinguishers shall be in accordance with NFPA-10. These standards provide measures for preventing or minimizing fire damage during these types of operations. Contact the Fire Department for guidance (568-8194/568-8195). The unique and dangerous situations confronting fire fighters during such operations demand that a complete exchange of pertinent information be established and continue during the life of the project.

The installation Fire Chief or (designated representative) will monitor contractor operations on maintenance and repair, construction and self-help projects. The contracting officer representative (COR) will notify the contractor and request prompt corrective action when they find fire hazards, unsafe practices or non compliance with specifications. The Fire Chief, if delegated this authority by the commander may stop any operation or activity when there is imminent danger to life and property.

This Contractor Fire Prevention Brochure is designed to assist you in establishing fire procedures on Fort Bliss property. The unsafe practices listed herein are just a fraction of many hazardous situations that could occur in or around construction areas.

The most hazardous situations have been listed for ready references. The Fire Department solicits your help in preventing fires. We stand ready to assist you in any matter pertinent to fire prevention or safety. Feel free to call on us any time you have a problem or any situation that might lead to a problem. We are located in building 11211, on Biggs Army Airfield and our phone numbers are 744-8194 or 744-8195.

FIRE **IN CASE OF**
 DIAL **911**

AMBULANCE **DIAL** 911 or 565-4100

MILITARY POLICE **DIAL** 118 or 568-2115

When reporting an emergency, give dispatcher the following information:

- a. NAME
- b. BUILDING NUMBER/ SITE LOCATION
- c. TYPE OF FIRE (STRUCTUAL, GRASS, ELECTRICAL, ETC.).
- d. EXACT LOCATION OF FIRE IF POSSIBLE

After speaking to the dispatcher have someone stand outside the building to direct emergency vehicles to your location. If at a remote location, state where emergency personnel can meet you and be guided to the scene.

NOTE: The Fire Department is available for advice and assistance on any matters pertaining to Fire Prevention and Protection.

Fire Prevention Office – 744-8194 or 744-8195

Fire Department Business – 568-5283

CONTRACTOR'S FIRE PREVENTION GUIDE

1. Prior to performing "Hot Work" (welding, soldering, cutting, tar pots, etc.) or operating other flame producing devices, contractor shall request the issuance of a Hot Work Permit. Permits will not be issued in advance. Insure all equipment is in place prior to calling. The telephone number to request the permit is 568-5283.
2. All painting materials to include paint brushes, empty paint cans, drop cloths etc., and flammable liquids shall be stored outside in authorized storage containers. The containers will be located at a safe distance from the building and insure they are not obstructing any Fire Department connections to that building.
3. Accumulation of trash, papers, shavings, sawdust, excelsior, boxes and other packing materials will be removed from the building at close of work day and disposed in proper containers located away from the building. Areas outside of the building undergoing work will be kept clean of trash, paper or other discarded combustibles.
4. Storage of lumber, roofing paper or other combustible supplies needed during construction shall be kept at a safe distance from the building if no storage yard is assigned.
5. All portable electric devices (saws, sanders, compressors, extension cords or lights) will be disconnected at the close of each workday.
6. All contractors will require their employees to familiarize themselves with locations of the nearest administrative telephones and the procedures when using their own cell phones. Employees will dial the emergency numbers provided in this guide book.
7. Contractors will report all fires no matter how small they may be. Use emergency numbers provided in the guide book.
8. Fire extinguishers in buildings shall not be removed from their locations or used for any purpose other than fire.
9. Fire hydrants will not be utilized without getting the consent of Ft. Bliss Water (569-5360) and the Asst Chief of Fire Prevention at 744-9896.
10. Fort Bliss Water will provide personnel for the operation of water valves pertaining to our water distribution system.
11. Smoking in buildings undergoing work is prohibited. Assign a designated smoking area with a proper receptacle for discarded smoking material
12. Contractors will notify the Fire Department if roads, Fire Lanes, etc., are to be blocked or closed. Call 568-5283, 744-8195.
13. Contractors will not work on sprinkler systems or any part of the alarm system without the approval of the Fort Bliss Fire Department. Call 568-5283 or 744-8195 prior to commencing work.

14. Prior to close of business the contractor will inspect the exterior and interior of the building to insure all guide lines have been followed.

Listed below are other areas of concern which may pose problems in and around the construction site:

- a. Improper storage of flammable materials
- b. Cleaning with flammables
- c. Improper use of extension cords
- d. The use of electrical equipment with faulty wiring
- e. The use of tools that are not UL approved
- f. Not following Hot Work Permit guide lines
- g. Smoking in unauthorized areas and or improper discard receptacles
- h. Blocking Fire Department Connections

Charles J. Butler, YN-02
Fire Chief
Fire and Emergency Service Division
Directorate of emergency Services

Receipt of Contractor's Fire Prevention Guide Acknowledgement

Date _____

Name: _____ **Company** _____

E-Mail Address _____

Work Site _____ **Telephone** _____

Fire Inspector: _____

E-Mail Address: _____

Signature _____

Telephone _____

Contractor Copy

Receipt of Contractor's Fire Prevention Guide Acknowledgement

Date _____

Name: _____ Company _____

E-Mail Address _____

Work Site _____ Telephone _____

Fire Inspector: _____

E-Mail Address: _____

Signature _____

Telephone _____

Inspectors
Copy

Print Form

No Ground Disturbance Is Authorized Before Concurring Signatures In ALL SIGNATURE BOXES Have Been Obtained

Section I: To Be Completed By Requesting IndividualGovernment Representative
Name/Phone numberPN#, NEPA#, WO#, SO#
Gov. Contract NumbersCompany name, address
and phone numberPurpose and location of
request:
(Describe what and where)

(Equipment must meet safety standards established by the Dept of Army and OSHA)

Requesting individual: (please print name, grade, title, PH#) Signature:

Date:

Section II: To Be Completed By Utility Integrator (COE), Bldg P140A, Next to T0071 @ Longknife

Resident Engineer: (print name, title, phone number)

Signature:

Date:

Section III: To Be Completed By DPW Master Planning Maps, Room 1 - Bldg 777 (915) 569-8400☐ Location of excavation has been checked and the location of existing utilities or interfering facilities is located on the maps furnished.☐ No mechanical excavation will be accomplished within three feet of utilities and hand tools will be used without exception.☐ Area excavated will be satisfactorily backfilled ☐ Drawings/electronic files furnished (to include irrigation systems)☐ Return to Operations & Maintenance Division (Room 317) after completion with **as-builts**

Signature:

Date:

Section IV: To Be Completed By DPW Master Planning Division Chief, Room 113 - Bldg 777 (915) 569-8449

Recommend:

Signature:

Date:

☐ Approval☐ Disapproval**Section V: To Be Completed By Directorate of Information Management (DOIM) - Bldg 56 (915) 744-4344**☐ Location of the proposed excavation has been checked and no underground communication cables exist in the vicinity of the excavation.☐ Location of proposed excavation has been checked and under ground communication cables exist in the vicinity of the excavation.
Call (915) 744-4344 prior to the beginning of any excavation work.

Recommend:

Signature:

Date:

☐ Approval☐ Disapproval**Section VI: To Be Completed By DPW-Environmental (DPW-E) - Bldg 624 (915) 568-6999 / 568-6746**

Recommend:

Comments:

☐ Approval☐ Disapproval

Signature:

Date:

Section VII: Obtain Following Approval Signatures:**Please note:** A service order is required to mark all utilities.Rio Grande Electric Service Representative
3633 Mattox Ave. (915) 778-0152

Date:

Signature:

Texas Gas Service Representative
4700 Pollard St. (915) 680-7329/680-7274

Date:

Signature:

Ft. Bliss Water Service Representative
Water and Sewer Bldg 1320 (915) 569-5359

Date:

Signature:

Pride Representative
(915) 568-1107

Date:

Signature:

Balfour Betty Representative Bldg 2022
(915) 564-0459

Date:

Signature:

Section VIII: Obtain Final Approval Signature:Final Approval from O&M Division Chief
Bldg 777, Room 317/ (915) 568-5233

Date:

Signature:

Tuesday, October 19, 2010

Tuesday, October 19, 2010

APPENDIX GG

Site Structures and Amenities

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- Walls and Fences
- Trash Receptacles
- Dumpsters
- Flagpoles
- Movable Planters
- Bicycle Racks
- Tree Grates
- Bollards
- Play Equipment
- Mailboxes
- Monuments, Memorials, Military Equipment Static Displays
- Drinking Fountains

11.3.3 Seating

Seating includes benches and walls, as well as tables and movable chairs.

11.3.3.1 Benches

11.3.3.1.1 Bench Location. Benches should be located in areas of high pedestrian use, and arranged to encourage socialization within a pleasant outdoor setting. This includes pedestrian nodes along primary walkways, at major building entryways, courtyards, and at bus stops.

11.3.3.1.2 Bench Siting. Benches should be sited on concrete pads adjacent to walkways. Provide proper clearance around benches, a minimum 2'0" setback from adjacent sidewalks and a minimum of 5'0" between front of bench and any stationary obstacle. Provide appropriate planting treatment for visual definition and seasonal shade.

11.3.3.1.3 Bench Design. Pre-Cast Concrete or Metal Benches. Pre-cast concrete or metal benches, with or without backs, are appropriate for the informal gathering, resting, eating and waiting uses characteristic of community facility areas. Standard bench size should be 6'-0" long. Metal support base should have a dark brown factory finish to match standard trim color. Wall mounted benches should be similar in style and color to free standing benches.

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11.3.3.2 Seating Walls

11.3.3.2.1 Seating Walls Location. Wherever possible, seating should be incorporated into planter boxes (Fig. 11.4) or retaining walls, particularly at building entrance areas. Seating walls should be integrated into the overall area design and the pedestrian circulation system.

11.3.3.2.2 Seating Wall Design. Seating walls should generally be between 18" and 22" high, 12" to 18" wide, and constructed of rock wall, textured concrete, or brick in a manner to complement or match the materials of the adjacent buildings.

11.3.3.3 Tables.

11.3.3.3.1 Locate tables together with seating that is oriented to the user needs of socializing, relaxing, or eating in less formal spaces with a pleasant setting and attractive view.

11.3.3.3.2 Table Location. Small groupings of tables in high visibility areas should be placed within proximity of recreation or food service facilities. These groupings should be located on hard pavement areas adjacent to walkways. Pavement should be constructed of exposed aggregate, broom finish concrete, or pavers. Incorporate tree plantings and overhead trellis structures within these areas to provide shade and spatial definition.

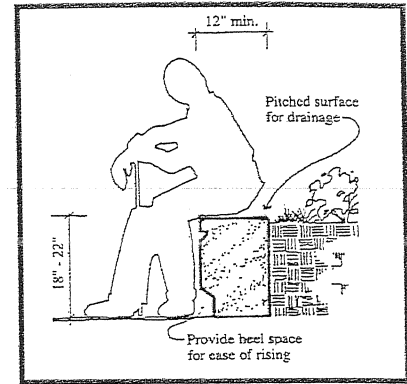


Figure 11.4 - Retaining Wall / Seating.

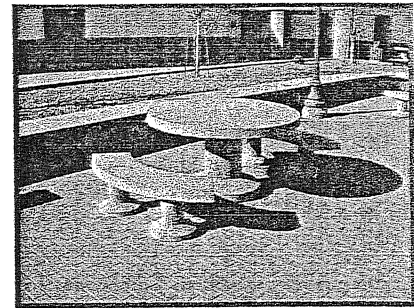


Fig. 11.5 – Seating Incorporated Into Planter Box at Dining Facility

11.3.4 Telephone Booths

Telephone booths should be incorporated into building architecture, utilizing building recesses and overhangs, or integrated into bus or other shelters. Provide a minimum 3'0" clearance between booths and the edge of walkways. All service line wiring should be underground or concealed. Booths should be equipped with lighting for nighttime use. In sheltered areas, use standard wall-mounted phone enclosures.

11.3.5 Shelters

11.3.5.1 There are many different types of shelters on military installations. Shelters are provided for those waiting for buses, and in areas where people congregate to socialize or eat such as in courtyards or picnic areas.

11.3.5.1.1 Bus Shelters

11.3.5.1.1.1 Bus Shelter Location. Bus shelters should be located at major facilities along the bus route such as Commissary/Post Exchange areas, barracks areas, hospital, and library. Bus stops should relate to major pedestrian walkways, and be placed on concrete pads. Provide a minimum 3'0" clearance between shelters and the edge of walks.

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11.3.5.1.1.2 Bus Shelter Design. Bus shelter design typically should be simple and consistent throughout the post, matching the existing units in terms of materials, scale, and detail (Fig. 11.6). The shelters should include an integral bench, and trash receptacle.

11.3.5.1.2 Picnic Shelters

11.3.5.1.2.1 Picnic Shelter Location. Picnic shelters should be strategically located and sized for shared use to discourage the proliferation of small shelters scattered throughout the installation.

11.3.5.1.2.2 Picnic Shelter Design. Picnic shelters can be open on all sides. The minimum size should be 20 feet square with a minimum 8-foot vertical clearance.

11.3.6 Kiosks

11.3.6.1 Kiosk Location

Kiosks can be used as information centers at pedestrian nodes within the town center. Provide kiosks only where they are needed on a concrete base adjacent to walkways. Allow a minimum of 3' clearance on all sides.

11.3.6.2 Kiosk Design

Kiosk design should blend compatibly with other site furnishings and with the architectural character of the zone in terms of form, scale, and materials. A similar design treatment should be established for kiosks and shelters.

11.3.7 Walls and Fences

11.3.7.1 Location and Use

Walls and fencing should be used to provide visual screening, define pedestrian plaza areas, wind screening, pedestrian and vehicular control, security, and to retain soil. The design of walls and fences should fulfill their function in harmony with the character and appearance of their setting.

11.3.7.2 Walls

Low walls should be used to define pedestrian courtyard areas and provide informal seating. Screening walls can be used where appropriate to screen building service areas. Walls adjacent to walkways should be free of any projections, such as signs or drain pipes that

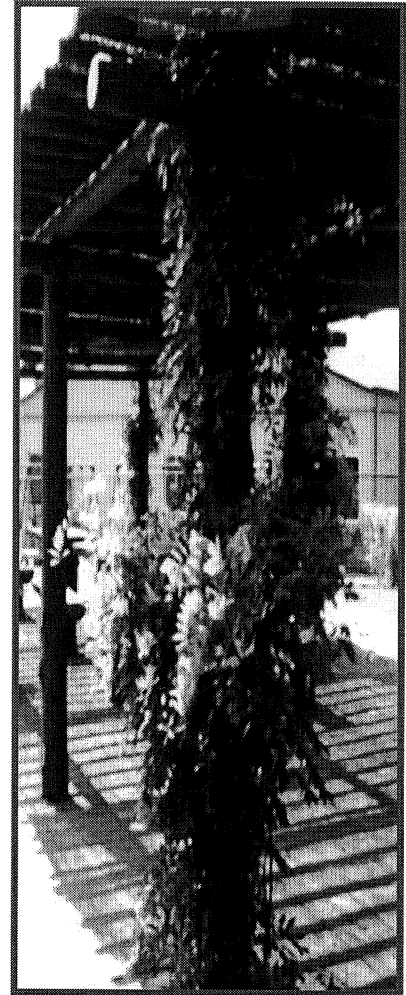


Fig. 11.6 - Trellis and Vines Provide Shelter.

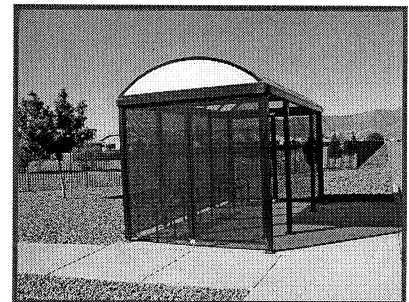


Fig. 11.7 – Typical Fort Bliss Bus Shelter.

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would pose a hazard to passing pedestrians. Construction of walls should incorporate either rock wall, brick to match adjacent buildings, with stone or concrete cap, or concrete with a textured finish and stone or concrete cap. Retaining walls (Fig. 11.8) may be constructed of native stone, brick, versa-lock modular stone with a light tan finish, or concrete block with a light tan stucco finish, concrete block planters, or other appropriate material.

11.3.7.3 Fences

Rock wall or other masonry fences should be utilized for screening of service areas and site utilities, particularly dumpsters. Chain link fences should be screened with trees and shrubs. The use of chain link fence should be held to a minimum in the cantonment area.

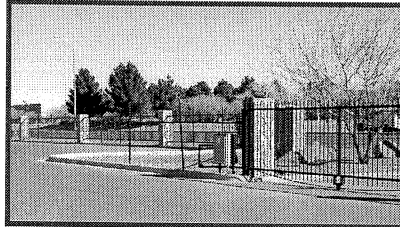


Fig. 11.9 – Wrought Iron Fence

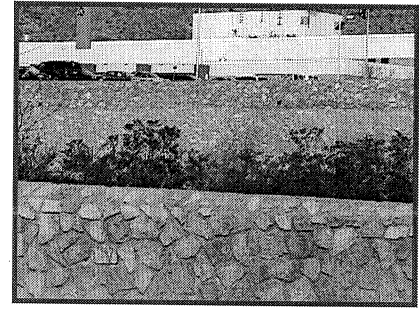


Fig. 11.8 - Indigenous Stone Retaining Wall

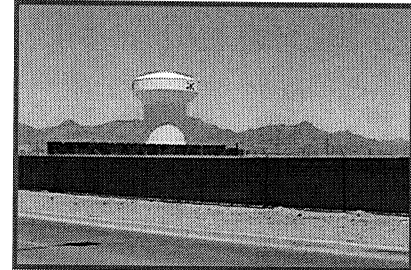


Fig. 11-10 – Chain Link Fence With Green Fabric Screening

11.3.7.3.1 Use of wrought iron fence where appropriate (Fig. 11.9).

11.3.7.3.2 Use chain link with green color fabric for storage yards and other appropriate areas (Fig. 11.10).

11.3.8 Trash Receptacles

11.3.8.1 Trash Receptacle Location

Trash containers should be highly visible and accessible for effective litter control. Containers should be located conveniently along walkways, near major pedestrian intersections, near building entrances and near seating and eating areas. Antiterrorism/force protection requirements restrict the location of dumpsters to a minimum of 10 meters (33 feet) from inhabited buildings and 25 meters (82 feet) from billeting and primary gathering areas (*Unified Facilities Criteria (UFC) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings*, Table B-1).

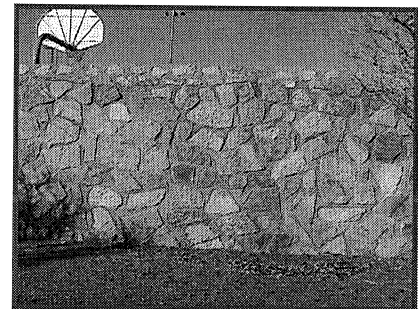


Fig. 11.11 - Six Foot Rock Wall

11.3.8.2 Trash Receptacle Design – Not Used

11.3.8.3 Trash Receptacle Type - Not Used

11.3.8.4 Dumpsters

11.3.8.4.1 Dumpster Location

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The location of dumpsters can have a significant visual impact, and should therefore be addressed as part of an overall building design and incorporated in site planning. To the greatest extent possible, incorporate dumpster placement into areas screened with walls. Avoid locating dumpsters along major circulation routes or use areas. Dumpsters should be directly accessible by way of a paved service drive or parking lot with adequate overhead clearance for collection vehicles.

Antiterrorism/force protection requirements restrict the location of dumpsters to a minimum of 10 meters (33 feet) from inhabited buildings and 25 meters (82 feet) from billeting and primary gathering areas (Unified Facilities Criteria (UFC) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings, Table B-1).

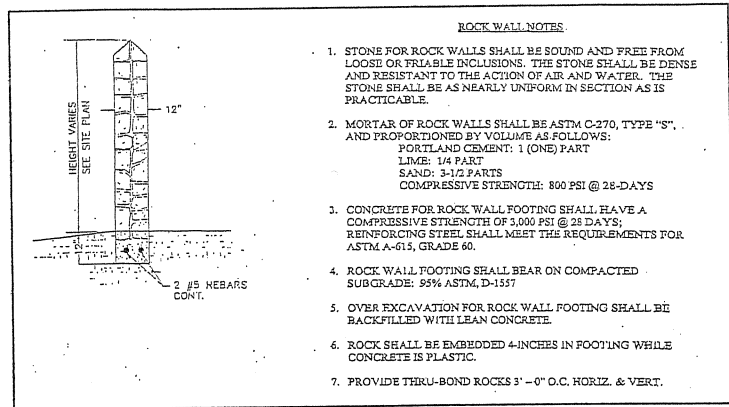


Fig. 11.12 – Construction Detail for Six Foot Rock Wall

11.3.8.4.2 Dumpster Site Design

Rock walls shall be 6' in height. All dumpsters should be placed on 12' x 12' concrete pads with aprons large enough to encompass the bearing points of the service vehicle (Fig. 11.12).

11.3.9 Flagpoles

The standard flagpole for Fort Bliss shall be tapered mill finish aluminum, fitted with a gold anodized finish "ball" finial (Fig. 11.13). The mounting detail should be simple with a concrete base flush at grade. A concrete pad should be used when poles are located in lawn areas. In plaza areas, flagpole locations and mounting detail should be integrated into the paving pattern. Flagpoles should include lighting and may be accented with planting beds around the base of the flagpole.

11.3.10 Planters

11.3.10.1 Movable pre-cast concrete planters may be used outside building entrances to provide seasonal color and interest and function as security threat barriers (Fig. 11.14).

Planters should be located so they impede vehicular access to a building, but not so they excessively impede pedestrian movement. Several planters of various sizes may be grouped together to produce an aesthetically pleasing display.

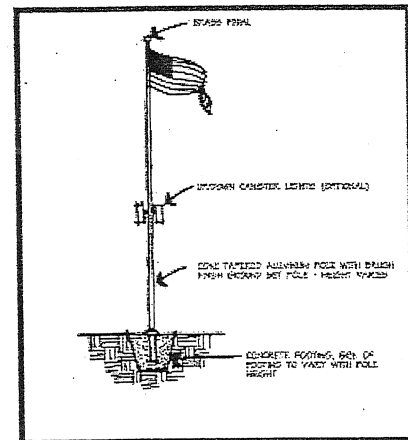


Fig. 11.13 – Standard Flagpole

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11.3.11 Bicycle Racks

Bicycle racks should be provided at key destination locations. They should be located on a concrete surface where they will not impede pedestrian movement or block building entrances.

A ribbon type tubular aluminum bike rack with an anodized dark bronze finish is the post standard (Fig. 11.15). Bicycle storage areas near barracks should be covered.

11.3.12 Tree Grates

Tree grates should be used when installing trees in large paved areas such as pedestrian plazas, walks, and ceremonial entrance courts. Tree grates and planting pits should be a minimum of 5'x 5'.

11.3.13 Bollards

Bollards are utilized to separate vehicular and pedestrian traffic, to direct access, or as decorative elements in pedestrian areas.

11.3.14 Playgrounds/Tot Lots

11.3.14.1 Installation playgrounds and tot lots should use equipment that is consistent throughout the installation or that meets specific criteria of materials, color, and design (Fig 11.16).

11.3.14.2 Playground Planning and Design

Guidance for planning and designing unsupervised outdoor play areas that meet child safety and child development requirements is found in Unified Facilities Criteria (UFC) 3-210-04, Design: Children's Outdoor Play Areas. The guidance given in this publication meets the needs of children with and without disabilities.

11.3.14.3 Playground Inspection and Maintenance

A play area inspection and maintenance program for Child Development Centers can be found in Technical Manual (TM) 5-663, Child Development Center, Play Area Inspection and Maintenance Program.

11.3.14.4 Recalled and Banned Playground Equipment

For updates on banned or recalled playground equipment consult the Consumer Product Safety Commission Press Releases and Recalls web site.

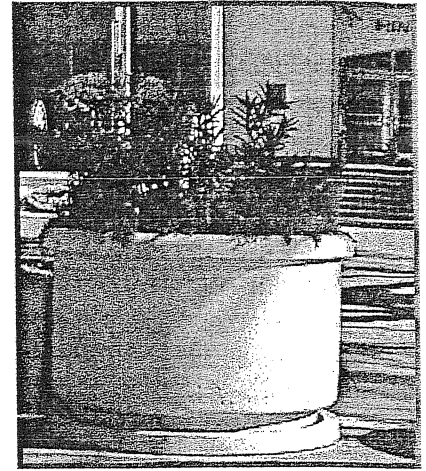


Fig. 11-14 – Movable Precast Concrete Planter

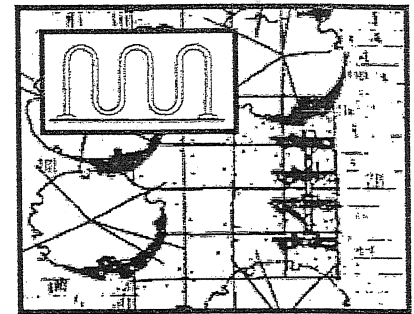


Fig. 11.15 – Bicycle Rack System

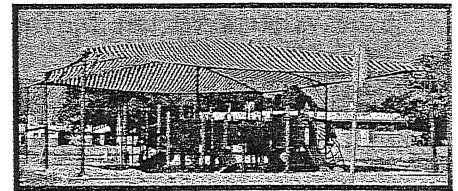


Fig. 11.16 - Playground and Tot Lot With Canopy For Shade

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Table 11.5.4 Lighting Design Matrix

		TYPICAL AREAS OF LIGHTING USE																		
TYPE		Entry Gates	Primary Roadways	Secondary Roadways	Tertiary Roadways	Primary Walkways/Bikeways	Secondary Walkways/Bikeways	Tertiary Walkways/Bikeways	Courtyards	Playgrounds	Ball fields	Basketball Courts	Tennis Courts	Buildings	Landscaping	Fence Perimeters	Signs & Monuments	Large Parking Lots	Small Parking Lots	Training areas
	Compact Fluorescent	•												•	•		•			
	Metal Halide	•							•	•	•	•	•		•	•	•			•
	High Pressure Sodium	•	•	•	•	•	•	•		•				•		•		•	•	•
LEVEL	Lux (lx)		20	15	10	10	2		50		200	200	50							
	Foot-candles (fc)		2	1.4	0.9	0.9	0.2		5		10	20	5.6			0.2		1	1	1
HEIGHT	30' Max	•	•	•	•									•	•			•		
	25' Max					•	•	•											•	
	15' Max																			
	Varies								•	•	•	•	•			•	•			•
FIXTURE	Cutoff	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Utility													•		•				•
	Bollard																			
	Spot																•			
	Wall Mount													•						
POLE	Metal	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	
	Wood															•				•
SPACING	120' Max		•	•	•												•		•	
	90' Max																		•	
	Varies													•			•			•

• = Appropriate usage

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11.6.6.4 Fire hydrants should be highly visible and free of any screening. They shall be nutmeg brown in color with luminous paint. Cap color shall indicate tested water pressure (Fig. 11.37).

Each fire hydrant shall include an antiterrorism check valve (ATV) designed to protect against accidental backflow and intentional contamination of drinking water via the hydrant. The ATV shall be a stealth check valve located internal to the upper barrel of the hydrant and shall consist of four main parts:

- A sleeve-insert valve seat, made of E coated or fusion bonded epoxy steel. The top of the valve seat shall have a machined slot to accommodate an EPDM quad ring which will provide an impenetrable seal between the seat and the valve.
- A valve made of brass with machined slots to accommodate an o-ring between the valve and the upper stem.
- A stainless steel machined upper stem will replace the original upper stem. The brass valve shall be attached to the upper stem in such a manner as to provide free vertical movement along the shaft.
- A stainless steel spring that shall fit around the upper stem and be of adequate compression strength and length that sufficient pressure is placed on the valve to provide an impenetrable seal when the hydrant is not in use and yet allow water to flow freely when the hydrant is flowed.
- The ATV shall be installed by a manufacturer certified technician.



Fig. 11.37 - Fire Hydrants Shall Be Nutmeg Brown. Cap Color Shall Indicate Tested Water Pressure.

11.6.7 Storm Drainage

11.6.7.1 Installation storm drainage systems should be appropriate to the character of development they serve. Storm drainage systems in densely developed areas require curbs, gutters, and underground lines. Storm drainage systems in low-density areas can utilize drainage swales and ditches that are contoured to be compatible with the natural landform. Where retention ponds are required, they should be designed to appear as a natural amenity that is part of the natural contour of the land, rather than a square or rectangular hole in the ground. Retention ponds that are designed to be dry most of the time can be utilized for recreational purposes or as open space. In either case, the areas should be designed to conform to the natural contours of the land. A recreational field that is an integral part of a Primary Facility, however, cannot be used as a retention pond.

11.6.7.2 Large hard surfaced parking lots should have covered drainage at the entry to prevent water draining into adjacent streets.

APPENDIX HH

DISTRIBUTION MATRIX

Indoor Aquatics Center (057434) Distribution List

Activity & Address	Drawing Size (Full Size)	Drawin g Size (Half Size)	Design Analysis	Specs	CD-ROM (D.A , specs . pdf & CADD .dwg)	Furniture Submittal (Per 01 33 16 Attach. B)	Structural Interior Design Submittal	BIM Data DVD (Per 01 33 16 Attach. F)
US Army Engineer District, Little Rock ATTN: Tammy Jones, Room 7508 700 West Capitol Ave. Little Rock, Arkansas 72201 501-324-5842 x1070		3	3	3	3	1	1	
US Army Engineer District, Ft. Worth ATTN: Norma Edwards 801 N Cherry Street, Suite 860 Ft. Worth, TX 76102 817-338-8653					1			
US Army Engineer District, Ft. Worth Ft. Bliss Biggs Area Office ATTN: Shahrukh Shahzada Bldg T-0071 (Corner of Velez & Sapper Streets) Fort Bliss, TX 79916 915-744-6011	4	4	4	4	4	4	4	
DPW, ATTN: Lissete Cortez Bldg 777, Rm 114 1733 Pleasanton Ave. Ft. Bliss, TX 79916 915-568-9063	1	1	1	1	3	2	2	
IMWE-BLS-PWE ATTN: J. Barrera Bldg 624, Pleasanton Ave., Ft. Bliss, TX 79916 915-568-3908		1		1	1			
Provost Marshal Office Physical Security (Thomas Cain) Bldg 116 Pershing Road Ft. Bliss, TX 79916 915-568-5151		1	1	1	1			
DOIM ATTN: Plans Office (Thomas Hopkins) Bldg 58, Doniphan Road Ft. Bliss, TX 79916 915-568-8194		1	1	1	1			
FESD, DES ATTN: J.L. Narlock 11211 Wright St. Fort Bliss, Texas 79916 915-568-9896					3			
IMWE-BLS-PWM ATTN: Ricardo Cortez Bldg 777, Rm 319 Pleasanton Ave Fort Bliss, TX 79916-6812 915-568-5201		4	1	1	7			
Installation Safety Office ATZC-CSS, Attn: Patty Akin Bldg 515-B, 1733 Pleasanton Road Ft. Bliss, TX 79916-6812 915-568-3772		1	1	1	1	1	1	

Activity & Address	Drawing Size (Full Size)	Drawing Size (Half Size)	Design Analysis	Specs	CD-ROM (D.A , specs . pdf & CADD .dwg)	Furniture Furnishings & Equipment Submittal	Structural Interior Design Submittal	BIM Data DVD (Per 01 33 16 Attach. F)
IMCOM West Region ATTN: Public Works Division (Pat Caraway) 2450 Stanley Road, Suite 101 Ft Sam Houston, TX 78234-6102 210-295-2178					1	1		
USAISEC-FDED ATTN:AMSEL-IE-DE-IN-OP (George Gaffney) 1435 Porter Street, Suite 230 Fort Detrick, MD 21702 301-619-6501		1	1	1	1			
IMWE-BLS-PLO DPTMS, Plans & Operations ATTN: Antiterrorism Office (Fernando Villalobos) Building 2, Wing C, Room 19 Sheridan Road Ft Bliss, Texas 79916 915-568-4127		1	1	1	1			
USAESCH ATTN: ED-CS-A, 3F-506 (Jay Clark) 4820 University Square Huntsville, Alabama 35816-1822 256-895-1673		1	1	1	1	1	1	
MWR Sports ATTN: Eric Hildreth Building 2930, Stout PFC Fort Bliss, Texas 79916 915-568-4508		1	1	1	1	1	1	
FMWRC Attn: Janet Mackinnon 4700 King Street Alexandria Virginia 22302 703-681-1544		1		1		1	1	
IMCOM West Region ATTN: IMWE-MWR (Darrell Manuel) 2450 Stanley Road, STE 100 BLDG #1000, 1 st Floor West Wing Ft Sam Houston, TX 78234-6102 210-295-2223		1		1		1	1	
Jacobs ATTN: Cecil Penn 777 Main Street Fort Worth, TX 76102 214-415-5802		2	2	2	2	1	1	1
Jacobs-Huitt-Zollars ATTN: Charlotte Yaeger BAO Annex, P140A Corner of Sapper & Velez Streets El Paso, TX 79906 915-568-8202					1	1	1	
Huitt Zollars ATTN: Blanca Berumen 3131 McKinney Ave, Suite 600 Dallas, TX 75204 214-871-3311		1	1	1	1			

Activity & Address	Drawing Size (Full Size)	Drawin g Size (Half Size)	Design Analysis	Specs	CD-ROM (D.A , specs . pdf & CADD .dwg)	Furniture Furnishings & Equipment Submittal	Structural Interior Design Submittal	BIM Data DVD (Per 01 33 16 Attach. F)
Jacobs ATTN: Dawn Happney 6688 North Central Expressway Suite 400, MB13 Dallas, TX 75206 972-533-2973					1	1	1	1
Totals/Contract	5	25	19	22	36	16	15	2

APPENDIX II

EAST BIGGS TOWN CENTER AREA DEVELOPMENT GUIDE

SECTIONS 1 & 2

SEE SEPARATE FILE AVAILABLE FROM CONTRACTING OFFICER

APPENDIX JJ

EAST BIGGS TOWN CENTER AREA DEVELOPMENT GUIDE

SECTIONS 3 & 4

SEE SEPARATE FILE AVAILABLE FROM CONTRACTING OFFICER

APPENDIX KK

EAST BIGGS TOWN CENTER AREA DEVELOPMENT GUIDE

SECTION 5, PART 1

SEE SEPARATE FILE AVAILABLE FROM CONTRACTING OFFICER

APPENDIX LL

EAST BIGGS TOWN CENTER AREA DEVELOPMENT GUIDE

SECTION 5, PART 2

SEE SEPARATE FILE AVAILABLE FROM CONTRACTING OFFICER

APPENDIX MM

EAST BIGGS TOWN CENTER AREA DEVELOPMENT GUIDE

SECTION 5, PART 3

SEE SEPARATE FILE AVAILABLE FROM CONTRACTING OFFICER

APPENDIX NN

EAST BIGGS TOWN CENTER AREA DEVELOPMENT GUIDE

SECTION 6

SEE SEPARATE FILE AVAILABLE FROM CONTRACTING OFFICER

APPENDIX OO

SITE SURVEY



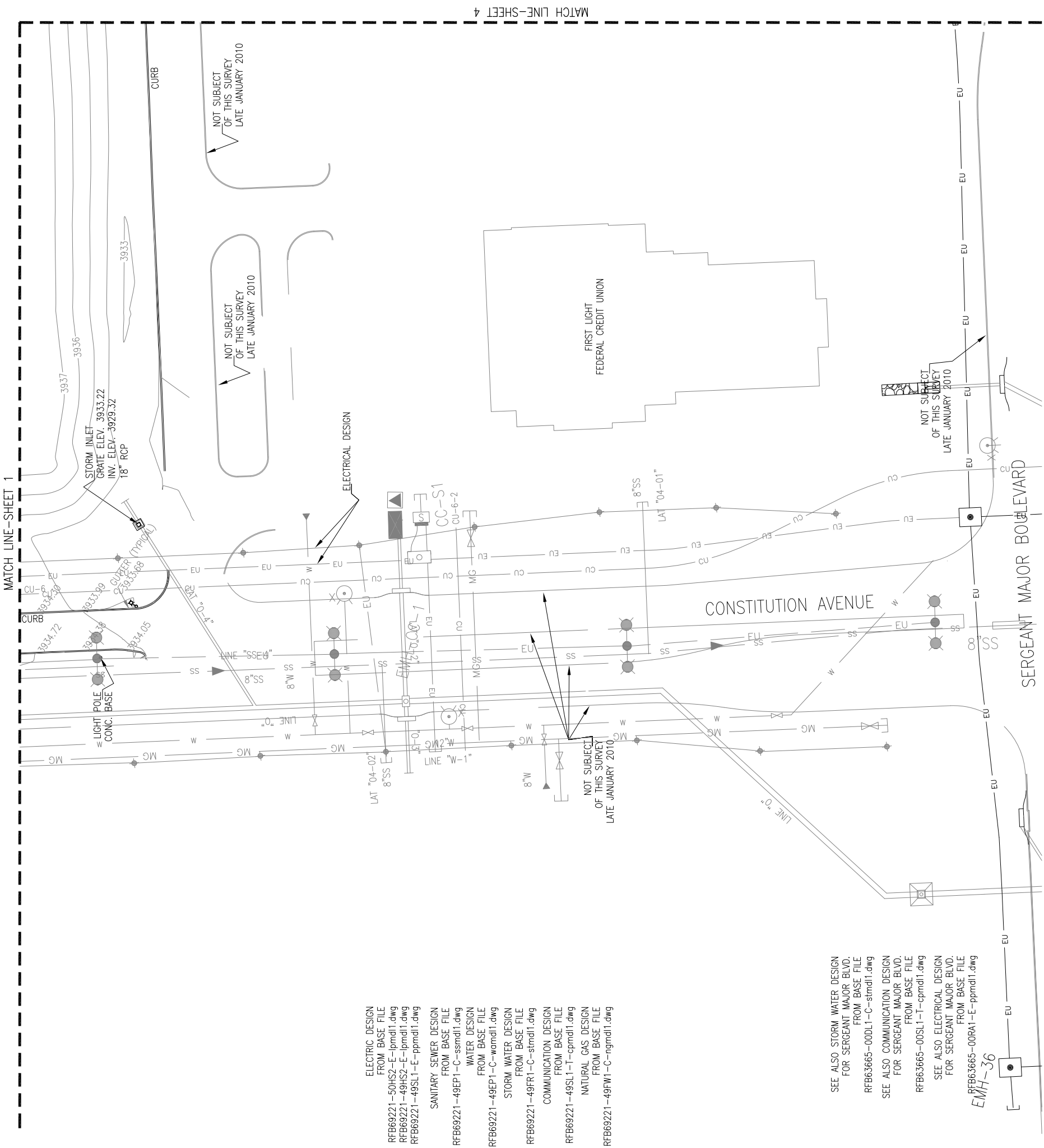
Mark	Description	D.D. NO.	Revision	Action	Date
sec	RESPOND TO COMMENTS BY SCOTT GRAVES				4-12-10

Designed by:	Chief, Arch. Branch
Submitted by:	File name:
Reviewed by:	Plot date:
Drawn by:	Drawing code:
Ckd by:	Design file no.
Date:	Rev.
03-29-10	

U.S. Army Engineer District, Fort Worth, Texas	JACOBS / HUNT-ZOLLARS 6688 North Central Expressway Suite 400, M813 Dallas, Texas 75206
Chief, Arch. Branch	Submitted by:
Reviewed by:	File name:
Drawn by:	Plot date:
Ckd by:	Drawing code:
Date:	Design file no.
03-29-10	Rev.

INDOR AQUATIC CENTER FORT BLISS, TEXAS	SURVEY/TOPOGRAPHY
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Sheet reference number: V-03	Sheet 3 of 4
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Communication Line from design files.	CU
Sanitary Sewer from design files.	SS
Water from design files.	W
Storm Sewer from design files.	○
Natural Gas from design files.	MC
Electric from design files.	EU

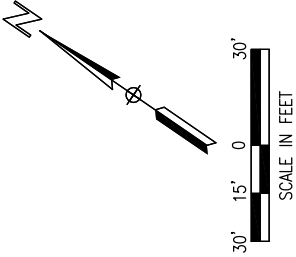
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FROM BASE FILE
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RFB69221-49HS2-E-lpmd1.dwg
RFB69221-49SL1-E-ppmd1.dwg
- SANITARY SEWER DESIGN
FROM BASE FILE
RFB69221-49EP1-C-ssmd1.dwg
- WATER DESIGN
FROM BASE FILE
RFB69221-49EP1-C-warnd1.dwg
- STORM WATER DESIGN
FROM BASE FILE
RFB69221-49FR1-C-strnd1.dwg
- COMMUNICATION DESIGN
FROM BASE FILE
RFB69221-49SL1-T-cpmd1.dwg
- NATURAL GAS DESIGN
FROM BASE FILE
RFB69221-49FW1-C-ngmd1.dwg

SEE ALSO STORM WATER DESIGN
FOR SERGEANT MAJOR BLVD.
FROM BASE FILE
RFB63665-00DL1-C-stdm1.dwg

SEE ALSO COMMUNICATION DESIGN
FOR SERGEANT MAJOR BLVD.
FROM BASE FILE
RFB63665-00SL1-T-cpmd1.dwg

SEE ALSO ELECTRICAL DESIGN
FOR SERGEANT MAJOR BLVD.
FROM BASE FILE
RFB63665-00RA1-E-ppmd1.dwg

EMH-36



SHT 1 OF 4	SHT 2 OF 4
SHT 3 OF 4	SHT 4 OF 4

NOTE:
SPOT ELEVATION LOCATION ARE SET AT MIDDLE
LEFT JUSTIFICATION.



Mark	Description	D.O. NO.	REVISION	Action	Date
sec	RESPOND TO COMMENTS BY SCOTT GRAVES				4-12-10

Designed by:	Date: 03-29-10	Rev:
Reviewed by:	Design file no.	
Submitted by:	Drawing code:	
Chief, Arch. Branch	File name:	Plot scale: 1:1

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS	JACOBS / HUNT-COLARS 6688 North Central Expressway Suite 400, MB13 Dollos, Texas 75206
RM/JK	Reviewed by:
Cld by:	Submitted by:
Chief, Arch. Branch	File name:

INDOR AQUATIC CENTER FORT BLISS, TEXAS	SURVEY/TOPOGRAPHY
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Sheet reference number: V-04	Sheet 4 of 4
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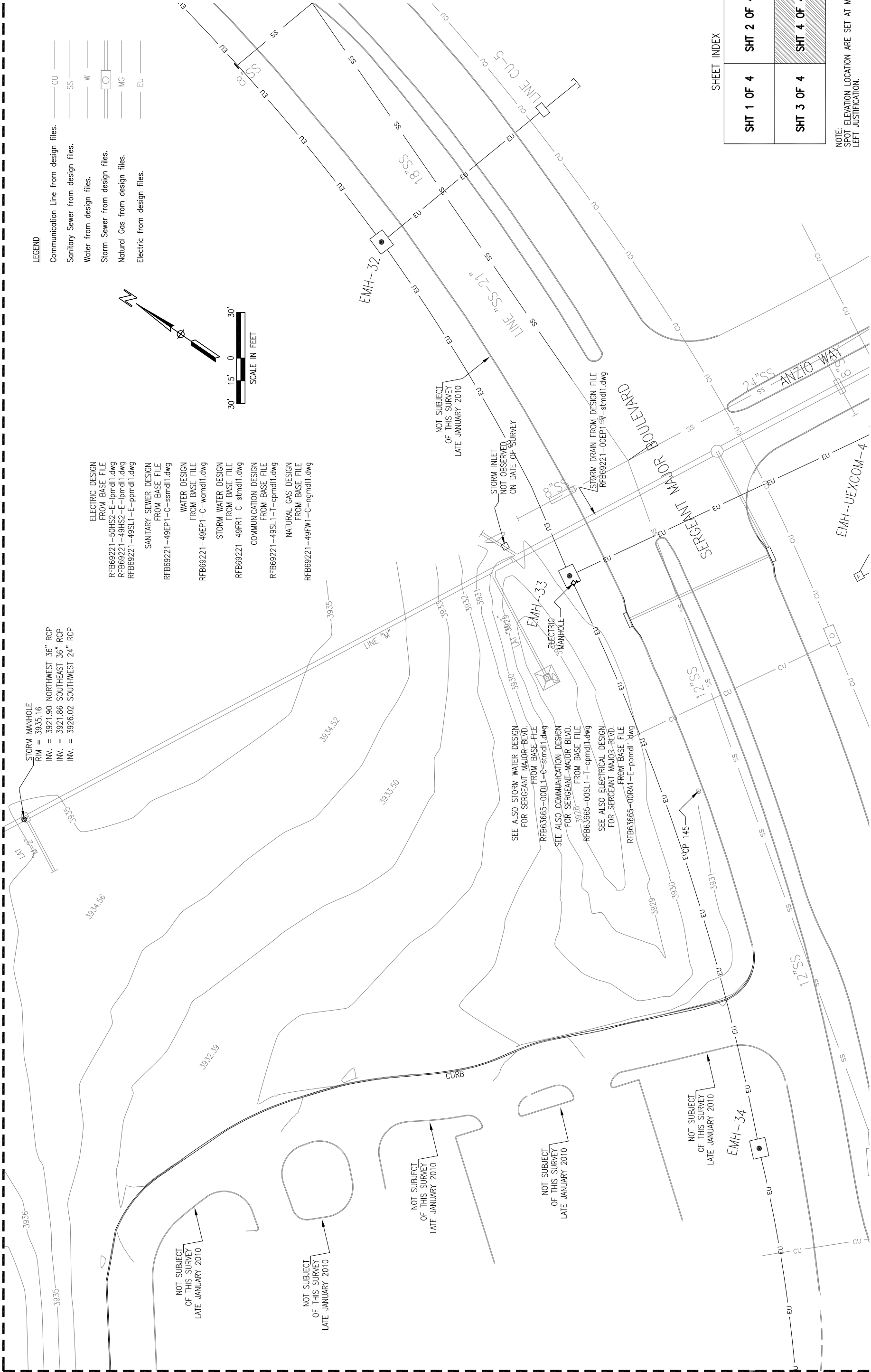
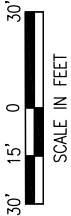
MATCH LINE-SHEET 2

STORM MANHOLE
RIM = 3935.16
INV. = 3921.90 NORTHWEST 36" RCP
INV. = 3921.86 SOUTHEAST 36" RCP
INV. = 3926.02 SOUTHWEST 24" RCP

- ELECTRIC DESIGN
FROM BASE FILE
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RFB69221-49HS2-E-tpnd1.dwg
RFB69221-49SL1-E-ppnd1.dwg
- SANITARY SEWER DESIGN
FROM BASE FILE
RFB69221-49EP1-C-ssnd1.dwg
- WATER DESIGN
FROM BASE FILE
RFB69221-49EP1-C-womd1.dwg
- STORM WATER DESIGN
FROM BASE FILE
RFB69221-49FR1-C-stmd1.dwg
- COMMUNICATION DESIGN
FROM BASE FILE
RFB69221-49SL1-T-cpnd1.dwg
- NATURAL GAS DESIGN
FROM BASE FILE
RFB69221-49FW1-C-ngmd1.dwg

LEGEND

- Communication Line from design files. — CU —
- Sanitary Sewer from design files. — SS —
- Water from design files. — W —
- Storm Sewer from design files. — MC —
- Natural Gas from design files. — MG —
- Electric from design files. — EU —



SHEET INDEX

SHT 1 OF 4	SHT 2 OF 4
SHT 3 OF 4	SHT 4 OF 4

NOTE:
SPOT ELEVATION LOCATION ARE SET AT MIDDLE
LEFT JUSTIFICATION.

MATCH LINE-SHEET 3

APPENDIX PP

Site Specifications

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
FORT WORTH DISTRICT

SPECIFICATION NO.:

CONTRACT NO.:

INDOOR AQUATICS CENTER
SITE INFRASTRUCTURE AND LANDSCAPE DESIGN
PN 57434

LDE DESIGN PACKAGE 097

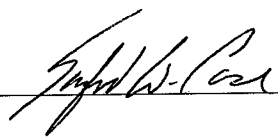
AT

FORT BLISS, TEXAS

DESIGN BY:

JACOBS / HUITT-ZOLIARS

6688 North Central Expressway
Suite 400, MB13
Dallas, Texas 75206

SPECIFICATION SUBMITTED BY: 

DATE: 06/21/10

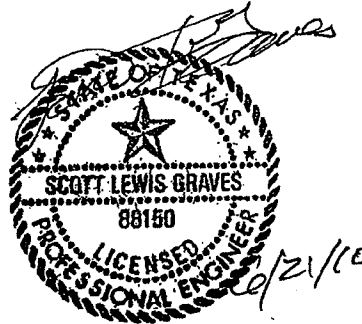
SPECIFICATION APPROVED BY: _____

DATE: _____

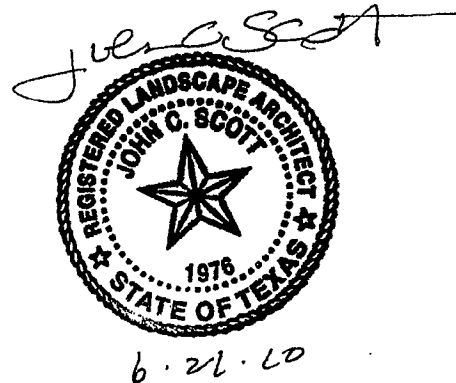
Tuesday, October 19, 2010

INDOOR AQUATICS CENTER
SITE INFRASTRUCTURE AND LANDSCAPE DESIGN
PN 57434
LDE DESIGN PACKAGE 097

Civil Engineer
Huitt-Zollars, Inc.
3131 McKinney Avenue, Suite 600
Dallas, TX 75204
214.871.3311
Firm Registration No. F-761



Landscape Architect
Huitt-Zollars, Inc.
3131 McKinney Avenue, Suite 600
Dallas, TX 75204
214.871.3311
Firm Registration No. F-761



Irrigation Design
Huitt-Zollars, Inc.
3131 McKinney Avenue, Suite 600
Dallas, TX 75204
214.871.3311
Firm Registration No. F-761

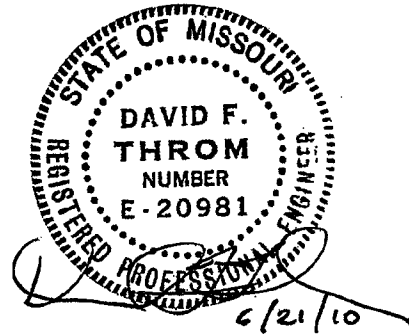


Lighting Engineer
Huitt-Zollars, Inc.
1500 South Dairy Ashford Rd., Suite 200
Houston, TX 77077
281.496.0066
Firm Registration No. F-761

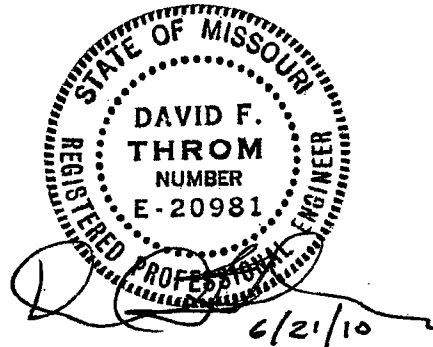


INDOOR AQUATICS CENTER
SITE INFRASTRUCTURE AND LANDSCAPE DESIGN
PN 57434
LDE DESIGN PACKAGE 097

Communications Engineer
Jacobs Engineering Group, Inc.
501 North Broadway
St. Louis, MO 63102
314.335.4000
Firm Registration No. F-2966



Electrical Engineer
Jacobs Engineering Group, Inc.
501 North Broadway
St. Louis, MO 63102
314.335.4000
Firm Registration No. F-2966



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01 56 20 DUST CONTROL FOR FORT BLISS
01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL
01 57 24.00 44 STORM WATER POLLUTION PREVENTION PLAN
01 62 35 RECYCLED / RECOVERED MATERIALS
01 74 19 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT
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-- End of Project Table of Contents --

SECTION 00 01 15

LIST OF DRAWINGS

01/07

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1.1 SUMMARY

This section lists the drawings for the project pursuant to contract clause "DFARS 252.236-7001, Contract Drawings, Maps and Specifications."

1.2 CONTRACT DRAWINGS

Contract drawings are as follows:

DRAWING NO.	SHEET NO.	TITLE
1	G-101	COVER SHEET - VOLUME ONE
2	G-201	INDEX SHEET SHEET 1-126
3	G-301	HAUL ROUTE & LOCATION MAP
4	G-302	BUILDING & PARKING ENVELOPE
5	G-303	POV PAVING OPTION LIMITS
6	G-400	LEED BOUNDARY

EROSION CONTROL PLANS

7	H-100	EROSION CONTROL PLAN, KEY MAP
8	H-101	EROSION CONTROL PLAN, GRID A-01
9	H-102	EROSION CONTROL PLAN, GRID A-02
10	H-103	EROSION CONTROL PLAN, GRID A-03
11	H-104	EROSION CONTROL PLAN, GRID A-04
12	H-105	EROSION CONTROL PLAN, GRID B-01

EROSION CONTROL DETAILS

13	H-301	SWPPP DETAILS
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14	C-000	DEMOLITION PLAN, KEY MAP
15	C-002	DEMOLITION PLAN, GRID A-02
16	C-003	DEMOLITION PLAN, GRID A-03
17	C-004	DEMOLITION PLAN, GRID A-04

DIMENSION CONTROL PLANS

18	C-100	POV PARKING DIMENSION CONTROL PLAN, KEY MAP
19	C-102	POV PARKING DIMENSION CONTROL PLAN, GRID A-02
20	C-103	POV PARKING DIMENSION CONTROL PLAN, GRID A-03
21	C-104	POV PARKING DIMENSION CONTROL PLAN, GRID A-04
22	C-111	LANDSCAPE DIMENSION CONTROL PLAN, GRID A-01
23	C-112	LANDSCAPE DIMENSION CONTROL PLAN, GRID A-02
24	C-113	LANDSCAPE DIMENSION CONTROL PLAN, GRID A-03
25	C-114	LANDSCAPE DIMENSION CONTROL PLAN, GRID A-04

GRADING PLANS

26	C-200	GRADING PLAN, KEY MAP
27	C-201	GRADING PLAN, GRID A-01
28	C-202	GRADING PLAN, GRID A-02
29	C-203	GRADING PLAN, GRID A-03

INDOOR AQUATICS CENTER - SITE INFRASTRUCTURE AND LANDSCAPE DESIGN

DP097

DRAWING NO.	SHEET NO.	TITLE
30	C-204	GRADING PLAN, GRID A-04
31	C-205	GRADING PLAN, GRID B-01
POV PARKING SLEEVING PLANS		
32	C-300	POV PARKING SLEEVING PLAN, KEY MAP
33	C-302	POV PARKING SLEEVING PLAN, GRID A-02
34	C-303	POV PARKING SLEEVING PLAN, GRID A-03
35	C-304	POV PARKING SLEEVING PLAN, GRID A-04
WATER PLAN & PROFILES		
36	C-500	WATER PLAN, KEY MAP
37	C-501	WATER PLAN AND PROFILE, LINE "W-1"
38	C-502	WATER PROFILES
SANITARY SEWER PLANS		
39	C-550	SANITARY SEWER PLAN, KEY MAP
40	C-551	SANITARY SEWER PLAN AND PROFILE, LINE "SS-1"
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41	N-100	GAS PLAN, KEY PLAN
42	N-101	GAS PLAN, LINE "G-1"
POV PARKING PAVING PLANS		
43	C-600	POV PARKING PAVING PLAN, KEY MAP
44	C-602	POV PARKING PAVING PLAN, GRID A-02
45	C-603	POV PARKING PAVING PLAN, GRID A-03
46	C-604	POV PARKING PAVING PLAN, GRID A-04
POV PARKING SIGNAGE AND STRIPING PLANS		
47	C-650	POV PARKING SIGNAGE AND STRIPING PLAN, KEY MAP
48	C-652	POV PARKING SIGNAGE AND STRIPING PLAN, GRID A-02
49	C-653	POV PARKING SIGNAGE AND STRIPING PLAN, GRID A-03
50	C-654	POV PARKING SIGNAGE AND STRIPING PLAN, GRID A-04
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51	C-700	STORM DRAINAGE PLAN, KEY PLAN
52	C-701	STORM DRAINAGE PLAN, GRID A-01
POV PARKING JOINTING PLANS		
53	C-800	POV PARKING JOINTING PLAN, KEY MAP
54	C-802	POV PARKING JOINTING PLAN, GRID A-02
55	C-803	POV PARKING JOINTING PLAN, GRID A-03
56	C-804	POV PARKING JOINTING PLAN, GRID A-04
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57	C-900	CIVIL DETAILS, WATER AND WASTEWATER DETAILS
58	C-901	CIVIL DETAILS, WATER AND WASTEWATER DETAILS
59	C-902	CIVIL DETAILS, WATER AND WASTEWATER DETAILS
60	C-903	CIVIL DETAILS, WATER AND WASTEWATER DETAILS
61	C-904	CIVIL DETAILS, WATER AND WASTEWATER DETAILS
62	C-905	CIVIL DETAILS, WATER AND WASTEWATER DETAILS
63	C-908	CIVIL DETAILS, WATER AND WASTEWATER DETAILS
64	C-909	CIVIL DETAILS, WATER AND WASTEWATER DETAILS
65	C-920	CIVIL DETAILS, CATHODIC PROTECTION DETAILS
66	C-921	CIVIL DETAILS, GAS DISTRIBUTION DETAILS
67	C-932	CIVIL DETAILS, PAVING DETAILS

INDOOR AQUATICS CENTER - SITE INFRASTRUCTURE AND LANDSCAPE DESIGN

DP097

DRAWING NO.	SHEET NO.	TITLE
68	C-933	CIVIL DETAILS, PAVING DETAILS
69	C-934	CIVIL DETAILS, PAVING DETAILS
70	C-950	CIVIL DETAILS, SIGNAGE AND STRIPING DETAILS
71	C-951	CIVIL DETAILS, SIGNAGE AND STRIPING DETAILS
72	C-960	CIVIL DETAILS, STORM DRAINAGE CURB INLET DETAILS
73	C-961	CIVIL DETAILS, STORM DRAINAGE CURB INLET DETAILS
74	C-966	CIVIL DETAILS, STORM DRAINAGE DETAILS
75	C-983	CIVIL DETAILS, DUMPSTER ENCLOSURE DETAILS
76	C-986	CIVIL DETAILS, IRRIGATION & CONDUIT SLEEVE DETAILS
77	G-102	COVER SHEET - VOLUME TWO

LANDSCAPE PLANTING PLANS

78	L-100	LANDSCAPE PLANTING PLAN, KEY MAP
79	L-111	LANDSCAPE PLANTING PLAN, GRID A-01
80	L-112	LANDSCAPE PLANTING PLAN, GRID A-02
81	L-113	LANDSCAPE PLANTING PLAN, GRID A-03
82	L-114	LANDSCAPE PLANTING PLAN, GRID A-04

LANDSCAPE SITE PLANS

83	L-200	LANDSCAPE SITE PLAN, KEY MAP
84	L-211	LANDSCAPE SITE PLAN, GRID A-01
85	L-212	LANDSCAPE SITE PLAN, GRID A-02
86	L-213	LANDSCAPE SITE PLAN, GRID A-03
87	L-214	LANDSCAPE SITE PLAN, GRID A-04

LANDSCAPE IRRIGATION PLANS

88	L-300	LANDSCAPE IRRIGATION PLAN, KEY MAP
89	L-311	LANDSCAPE IRRIGATION PLAN, GRID A-01
90	L-312	LANDSCAPE IRRIGATION PLAN, GRID A-02
91	L-313	LANDSCAPE IRRIGATION PLAN, GRID A-03
92	L-314	LANDSCAPE IRRIGATION PLAN, GRID A-04
93	L-390	COMMUNICATION IRRIGATION PLAN

LANDSCAPE DETAILS

94	L-400	LANDSCAPE DETAILS, PAVING DETAILS
95	L-401	LANDSCAPE DETAILS, PLANTING DETAILS
96	L-402	LANDSCAPE DETAILS, PLANTING DETAILS
97	L-403	LANDSCAPE DETAILS, PLANT SCHEDULE
98	L-430	LANDSCAPE IRRIGATION DETAILS, IRRIGATION DETAILS
99	L-431	LANDSCAPE IRRIGATION DETAILS, IRRIGATION DETAILS
100	L-432	LANDSCAPE IRRIGATION DETAILS, IRRIGATION DETAILS
101	L-433	LANDSCAPE IRRIGATION DETAILS, IRRIGATION DETAILS
102	L-434	LANDSCAPE IRRIGATION DETAILS, IRRIGATION DETAILS
103	L-435	LANDSCAPE IRRIGATION DETAILS, IRRIGATION DETAILS
104	L-436	LANDSCAPE IRRIGATION DETAILS, IRRIGATION DETAILS

ELECTRICAL SITE PLANS

105	U-300	ELECTRICAL SITE PLAN, OVERALL INDEX
106	U-301	ELECTRICAL SITE PLAN, GRID A-02
107	U-310	ELECTRICAL DUCT BANK, PROFILE

POV PARKING LIGHTING PLANS

108	U-350	LIGHTING KEY PLAN, KEY MAP
109	U-352	LIGHTING PLAN, GRID A-02
110	U-353	LIGHTING PLAN, GRID A-03

INDOOR AQUATICS CENTER - SITE INFRASTRUCTURE AND LANDSCAPE DESIGN

DP097

DRAWING NO.	SHEET NO.	TITLE
111	U-354	LIGHTING PLAN, GRID A-04
COMMUNICATIONS SITE PLANS		
112	U-400	COMMUNICATIONS SITE PLAN, OVERALL INDEX
113	U-401	COMMUNICATIONS SITE PLAN, GRID A-02
114	U-410	COMMUNICATIONS DUCT BANK PROFILE
DIAGRAMS		
115	U-601	ELECTRICAL, WIRING DIAGRAM
116	U-610	COMMUNICATIONS DUCT BANK, ONE-LINE DIAGRAM
ELECTRICAL DETAILS		
117	U-621	LIGHTING DETAILS, DETAIL
118	U-622	LIGHTING DETAILS, DETAIL
119	U-831	ELECTRICAL DETAILS, DUCT BANK SECTIONS
120	U-832	ELECTRICAL DETAILS, DUCT BANK SECTIONS
121	U-833	ELECTRICAL DETAILS, MANHOLES
122	U-834	ELECTRICAL DETAILS, TRANSFORMER AND VAULT
COMMUNICATIONS DETAILS		
123	U-871	COMMUNICATIONS DETAILS, DUCT BANK SECTIONS
124	U-872	COMMUNICATIONS DETAILS, HANDHOLES
125	U-873	COMMUNICATIONS DETAILS, MANHOLE FOLD-OUTS

-- End of Document --

SECTION 01 33 00

SUBMITTAL PROCEDURES

06/10

PART 1 GENERAL

The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections.

Units of weights and measures used on all submittals are to be the same as those used in the contract drawings.

Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

Contractor's Quality Control (CQC) System Manager and the Designer of Record, if applicable, to check and approve all items prior to submittal and stamp, sign, and date indicating action taken. Proposed deviations from the contract requirements are to be clearly identified. Include within submittals items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals.

Submittals requiring Government approval are to be scheduled and made prior to the acquisition of the material or equipment covered thereby. Pick up and dispose of samples not incorporated into the work in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

1.1 DEFINITIONS

1.1.1 Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by Submittal Description (SD) numbers and titles as follows:

SD-01 Preconstruction Submittals

Submittals which are required prior to start of construction (work) or the start of the next major phase of the construction on a multi-phase contract. Includes schedules, tabular list of data, or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work, submitted prior to start of construction work start of construction work or next major phase of construction.

Certificates of insurance

Surety bonds

List of proposed Subcontractors

List of proposed products

Construction Progress Schedule

Network Analysis Schedule (NAS)

Submittal register

Schedule of prices

Health and safety plan

Work plan

Quality control (QC) plan

Environmental protection plan

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Fabricated or unfabricated physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

Design calculations, mix designs, analyses or other data pertaining to a part of work.

Design submittals, design substantiation submittals and extensions of design submittals.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must have been within three years of date of contract award for the project.)

Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports.

Daily logs and checklists.

Final acceptance test and operational test procedure.

SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a manufacturer, supplier, installer or Subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

Confined space entry permits.

Text of posted operating instructions.

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and (MSDS) concerning impedances, hazards and safety precautions.

SD-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must be signed by an authorized official of a testing laboratory or agency and must state the test results; and indicate whether the material,

product, or system has passed or failed the test.

Factory test reports.

SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel, including manufacturer's help and product line documentation necessary to maintain and install equipment. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

This data is intended to be incorporated in an operations and maintenance manual or control system.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

Special requirements necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

Interim "DD Form 1354" with cost breakout for all assets 30 days prior to facility turnover.

1.1.2 Approving Authority

Office or designated person authorized to approve submittal.

1.1.3 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, except those SD-01 Pre-Construction Submittals noted above, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with this section.

SD-01 Preconstruction Submittals

Submittal Register; G

1.3 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.3.1 Government Approved G

Government approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Government approval is required for any deviations from the Solicitation or Accepted Proposal and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled, "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.3.2 Designer of Record Approved/Government Conformance Review (DA/CR)

1.3.2.1 Substitutions

Unless prohibited or provided for otherwise elsewhere in the Contract, where the accepted contract proposal named products, systems, materials or equipment by manufacturer, brand name and/or by model number or other specific identification, and the Contractor desires to substitute manufacturer or model after award, submit a requested substitution for Government concurrence. Include substantiation, identifying information and the DOR's approval, as meeting the contract requirements and that it is equal in function, performance, quality and salient features to that in the accepted contract proposal. If the Contract otherwise prohibits substitutions of equal named products, systems, materials or equipment by manufacturer, brand name and/or by model number or other specific identification, the request is considered a "variation" to the contract. Variations are discussed below in paragraphs: "Designer of Record Approved/Government Approved" and "VARIATIONS"

1.3.3 Information Only

Submittals not requiring Government approval will be for information only. For Design-build construction all submittals not requiring Designer of Record or Government approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.4 PREPARATION

1.4.1 Transmittal Form

Use the attached sample transmittal form (ENG Form 4025) for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. These forms are included in the QCS software that the Contractor is required to use for this contract. Properly complete this form by filling out all the heading blank spaces and identifying each item submitted. Exercise special care to ensure proper listing of the specification paragraph and sheet number of the contract drawings pertinent to the data submitted for each item.

1.5 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work;

and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe. For design-build construction the Government will retain 6 copies of information only submittals.

1.6 VARIATIONS

Variations from contract requirements require both Designer of Record (DOR) and Government approval pursuant to contract Clause FAR 52.236-21 and will be considered where advantageous to Government.

1.6.1 Considering Variations

Discussion with Contracting Officer prior to submission, after consulting with the DOR, will help ensure functional and quality requirements are met and minimize rejections and re-submittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

Specifically point out variations from contract requirements in transmittal letters. Failure to point out deviations may result in the Government requiring rejection and removal of such work at no additional cost to the Government.

1.6.2 Proposing Variations

When proposing variation, deliver written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government, including the DOR's written analysis and approval. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

Check the column "variation" of ENG Form 4025 for submittals which include proposed deviations requested by the Contractor. Set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

1.6.3 Warranting That Variations Are Compatible

When delivering a variation for approval, Contractor, including its Designer(s) of Record, warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.6.4 Review Schedule Is Modified

In addition to normal submittal review period, a period of 10 working days will be allowed for consideration by the Government of submittals with variations.

1.7 SUBMITTAL REGISTER

Prepare and maintain submittal register, as the work progresses. Do not change data which is output in columns (c), (d), (e), and (f) as delivered by Government; retain data which is output in columns (a), (g), (h), and

(i) as approved. A submittal register showing items of equipment and materials for which submittals are required by the specifications is provided as an attachment. This list may not be all inclusive and additional submittals may be required. Maintain a submittal register for the project in accordance with Section 01 45 00.10 10 QUALITY CONTROL SYSTEM (QCS). The Government will provide the initial submittal register.

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD No. and type, e.g. SD-02 Shop Drawings) required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

Thereafter, the Contractor is to track all submittals by maintaining a complete list, including completion of all data columns, including dates on which submittals are received and returned by the Government.

The Contractor is required to complete the submittal register and submit it to the Contracting Officer for approval within 30 calendar days after Notice to Proceed. The approved submittal register will serve as a scheduling document for submittals and will be used to control submittal actions throughout the contract period. Coordinate the submit dates and need dates with dates in the Contractor prepared progress schedule. Submit monthly or until all submittals have been satisfactorily completed, updates to the submittal register showing the Contractor action codes and actual dates with Government action codes. Revise the submittal register when the progress schedule is revised and submit both for approval.

1.7.1 Use of Submittal Register

Submit submittal register. Submit with QC plan and project schedule. Verify that all submittals required for project are listed and add missing submittals. Coordinate and complete the following fields on the register submitted with the QC plan and the project schedule:

Column (a) Activity Number: Activity number from the project schedule.

Column (g) Contractor Submit Date: Scheduled date for approving authority to receive submittals.

Column (h) Contractor Approval Date: Date Contractor needs approval of submittal.

Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.

1.7.2 Contractor Use of Submittal Register

Update the following fields with each submittal throughout contract.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

Column (l) List date of submittal transmission.

Column (q) List date approval received.

1.7.3 Approving Authority Use of Submittal Register

Update the following fields.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (l) List date of submittal receipt.

Column (m) through (p) List Date related to review actions.

Column (q) List date returned to Contractor.

1.7.4 Government Review Action Codes

Entries for columns (j) and (o), are to be used as follows (others may be prescribed by Transmittal Form):

"A" - "Approved as submitted"; "Completed"

"B" - "Approved, except as noted on drawings"; "Completed"

"C" - "Approved, resubmission required"; "Resubmit"

"D" - "Returned by correspondence"; "Completed"

"E" - "Disapproved (See attached)"; "Resubmit"

"F" - "Receipt acknowledged"; "Completed"

"G" - "Other (Specify)"; "Resubmit"

"X" - "Receipt acknowledged, does not comply"; "Resubmit"

1.7.5 Copies Delivered to the Government

Deliver one copy of submittal register updated by Contractor to Government with each invoice request.

1.8 SCHEDULING

Schedule and submit concurrently submittals covering component items forming a system or items that are interrelated. Include certifications to be submitted with the pertinent drawings at the same time. No delay damages or time extensions will be allowed for time lost in late submittals.

- a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential resubmittal of requirements.
- b. Submittals called for by the contract documents will be listed on the register. If a submittal is called for but does not pertain to the

contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the Contracting Officer does not relieve the Contractor of supplying submittals required by the contract documents but which have been omitted from the register or marked "N/A."

- c. Re-submit register and annotate monthly by the Contractor with actual submission and approval dates. When all items on the register have been fully approved, no further re-submittal is required.
- d. Carefully control procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

1.9 GOVERNMENT APPROVING AUTHORITY

When approving authority is Contracting Officer, the Government will:

- a. Note date on which submittal was received.
- b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.
- c. Identify returned submittals with one of the actions defined in paragraph entitled, "Review Notations," of this section and with markings appropriate for action indicated.

Upon completion of review of submittals requiring Government approval, stamp and date approved submittals. 6 copies of the approved submittal will be retained by the Contracting Officer and 1 copies of the submittal will be returned to the Contractor. If the Government performs a conformance review of other Designer of Record approved submittals, the submittals will be so identified and returned, as described above.

1.10 DISAPPROVED OR REJECTED SUBMITTALS

Contractor shall make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice as required under the clause entitled, "Changes," is to be given to the Contracting Officer. Contractor is responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in the Government requiring rejection and removal of such work at the Contractor's expense.

If changes are necessary to submittals, the Contractor shall make such revisions and submission of the submittals in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.11 APPROVED/ACCEPTED SUBMITTALS

The Contracting Officer's approval or acceptance of submittals is not be construed as a complete check, and indicates only that the general method of construction, materials, detailing and other information are satisfactory design, general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted Proposal.

Approval or acceptance will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work.

After submittals have been approved or accepted by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.12 APPROVED SAMPLES

Approval of a sample is only for the characteristics or use named in such approval and is not be construed to change or modify any contract requirements. Before submitting samples, the Contractor to assure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Match the approved samples for materials and equipment incorporated in the work. If requested, approved samples, including those which may be damaged in testing, will be returned to the Contractor, at his expense, upon completion of the contract. Samples not approved will also be returned to the Contractor at its expense, if so requested.

Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make of that material. Government reserves the right to disapprove any material or equipment which previously has proved unsatisfactory in service.

Samples of various materials or equipment delivered on the site or in place may be taken by the Contracting Officer for testing. Samples failing to meet contract requirements will automatically void previous approvals. Contractor to replace such materials or equipment to meet contract requirements.

Approval of the Contractor's samples by the Contracting Officer does not relieve the Contractor of his responsibilities under the contract.

1.13 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained. No payment for materials incorporated in the work will be made if all required Designer of Record or required Government approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.

1.14 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements is to be similar to the following:

CONTRACTOR
(Firm Name)
_____ Approved
_____ Approved with corrections as noted on submittal data and/or attached sheets(s)
SIGNATURE: _____
TITLE: _____
DATE: _____

For design-build construction, both the Contractor Quality Control System Manager and the Designer of Record are to stamp and sign to certify that the submittal meets contract requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	GOVT OR CLASSIFICATION REVIEW	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION		DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 33 00	SD-01 Preconstruction Submittals														
			Submittal Register	1.7	G												
		01 56 20	SD-01 Preconstruction Submittals														
			Dust Control	3.1	G												
			Products and Procedures	2.1	G												
			SD-02 Shop Drawings														
			Recordkeeping	1.6													
		01 57 23	SD-01 Preconstruction Submittals														
			Storm Water Pollution Prevention	1.3.2													
			Plan														
			Storm Water Pollution Prevention	3.1													
			Plan														
			Storm Water Notice of Intent	1.3.2													
			SD-07 Certificates														
			Mill Certificate or Affidavit	2.1.3													
		01 57 24.00 44	SD-01 Preconstruction Submittals														
			Storm Water Pollution Prevention	5.6	G												
			Plan														
			Notice of Termination	11.2	G PER-												
		01 74 19	SD-01 Preconstruction Submittals														
			Waste Management Plan	1.6	G												
			SD-07 Certificates														
			Waste Diversion Report	1.7	G												
			SD-11 Closeout Submittals														
			Records	1.7													
		01 78 00.00 40	SD-01 Preconstruction Submittals														

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(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 78 00.00 40	Reproducible Drawings	1.3													
			CAD System Drawings	1.3													
			SD-02 Shop Drawings														
			Record Drawings	1.3													
			SD-03 Product Data														
			Spare Parts Data	1.3													
			SD-07 Certificates														
			Work Plan	1.3													
			SD-08 Manufacturer's Instructions														
			Preventative Maintenance	1.3													
			Inspection	1.3													
			Posted Instructions	1.3													
			SD-10 Operation and Maintenance														
			Data														
			Operation and Maintenance	3.1													
			Manuals														
		02 41 00	SD-01 Preconstruction Submittals														
			Existing Conditions	1.6.1													
			SD-07 Certificates														
			Demolition Plan	1.10													
			Notifications	1.4.1													
		03 15 13.00 10	SD-02 Shop Drawings														
			Waterstops	2.3	G												
			SD-03 Product Data														
			Preformed Expansion Joint Filler	2.1													
			Sealant	2.2													

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						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION		DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		03 15 13.00 10	Waterstops	2.3													
			SD-04 Samples														
			Lubricant for Preformed	2.2.2													
			Compression Seals														
			Field-Molded Type	2.2.3													
			Non-metallic Materials	2.3.3													
			SD-07 Certificates														
			Preformed Expansion Joint Filler	2.1													
			Sealant	2.2													
			Waterstops	2.3													
		03 20 01.00 10	SD-02 Shop Drawings														
			Reinforcement	3.1	G												
			SD-03 Product Data														
			Welding	1.3													
			SD-07 Certificates														
			Reinforcing Steel	2.3													
		03 31 00.00 10	SD-03 Product Data														
			Curing Materials	2.4													
			Joint fillers	2.9.1													
			Recycled Content Products	Part 2													
			Portland Cement	1.2													
			Ready-Mixed Concrete	3.2.1													
			Waterstops	2.9.1													
			Chemical Admixtures	2.3													
			Epoxy-Resin	2.8													
			SD-06 Test Reports														

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ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT CLASSIFICATION REVIEW	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY						REMARKS
						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		03 31 00.00 10	Testing and Inspection for CQC	3.10	G												
			SD-07 Certificates														
			Qualifications	1.4													
			SD-11 Closeout Submittals														
			Local/Regional Materials	1.6.1													
			Cementitious Materials	2.1													
			Aggregate	1.2.4													
		03 40 00.00 10	SD-01 Preconstruction Submittals														
			Quality Control Procedures	1.5.2.2													
			SD-02 Shop Drawings														
			Standard Precast Units	1.4.1	G												
			Custom-Made Precast Units	1.4.2	G												
			SD-03 Product Data														
			Standard Precast Units	1.4.1													
			Proprietary Precast Units	1.4.3													
			Embedded Items	3.1.3													
			Accessories	2.1.10													
			SD-05 Design Data														
			Design Calculations	1.4.2													
			Concrete Mix Proportions	1.4.5.1													
			SD-06 Test Reports														
			Test Reports	1.5.2.2													
			SD-07 Certificates														
			Quality Control Procedures	1.5.2.2													
		12 93 00	SD-02 Shop Drawings														
			Benches	2.3.4.3	G												

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ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT CLASS OR A/E REVIEW ACTION	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY						REMARKS
						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		12 93 00	Benches	2.5	G												
			Assembly Instruction Drawings	1.3.3													
			Trash Receptacles	2.3.4.3	G												
			Trash Receptacles	2.5	G												
			SD-03 Product Data														
			Benches	2.3.4.3													
			Benches	2.5													
			Bicycle Racks	2.3.4.3													
			Trash Receptacles	2.3.4.3													
			Trash Receptacles	2.5													
			SD-04 Samples														
			Finish	2.3.4	G												
			SD-06 Test Reports														
			Recycled Materials	2.1.10													
			Testing	3.3													
			SD-07 Certificates														
			Primer certificate	1.3.4													
			Powder coatings certificate	1.3.5													
		26 05 00.00 40	SD-01 Preconstruction Submittals														
			Material, Equipment, and Fixture Lists	1.5													
			Conduits, Raceway sand Fittings	3.1													
			Wire and Cable	3.2													
			Splices and Connectors	2.2													
			SD-03 Product Data														
			Conduits, Raceway sand Fittings	3.1													

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						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION		DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		26 05 00.00 40	Wire and Cable	3.2													
			Splices and Connectors	2.2													
			SD-08 Manufacturer's Instructions														
			Manufacturer's Instructions	1.5													
		26 05 71.00 40	SD-01 Preconstruction Submittals														
			Fuses	2.3													
			SD-02 Shop Drawings														
			Connection Diagrams	1.4													
			Fabrication Drawings	1.4													
			Control Devices	3.1													
			Protective Devices	3.1													
			SD-03 Product Data														
			Enclosures	2.1													
			Circuit Breakers	2.2													
			SD-08 Manufacturer's Instructions														
			Control Devices	3.1													
			Protective Devices	3.1													
			SD-10 Operation and Maintenance														
			Data														
			Circuit Breakers	2.2													
		26 08 00	SD-06 Test Reports														
			Acceptance tests and inspections	3.1	G												
			SD-07 Certificates														
			Qualifications	1.5.1	G												
			Acceptance test and inspections	1.5.3	G												
			procedure														

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ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	GOVT OR CLASSIFICATION REVIEWER	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY						REMARKS
						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		26 12 19.10	SD-02 Shop Drawings														
			Pad-mounted transformer drawings	1.6.1	G												
			SD-03 Product Data														
			Pad-mounted transformers	2.2	G												
			SD-06 Test Reports														
			Acceptance checks and tests	3.6.1	G												
			SD-09 Manufacturer's Field Reports														
			design tests	2.7.2	G												
			routine and other tests	2.7.3	G												
			SD-10 Operation and Maintenance Data														
			Transformer(s)	1.7.1	G												
			SD-11 Closeout Submittals														
			Transformer test schedule	2.7.1	G												
		26 24 16.00 40	SD-02 Shop Drawings														
			Detail Drawings	1.2													
			Outline Drawings	1.2													
			SD-03 Product Data														
			Panelboards	2.1													
			Directory Card and Holder	2.3													
			Filtered Panelboard	2.4													
			SD-04 Samples														
			keys	2.1													
			SD-06 Test Reports														

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CONTRACTOR

INDOOR AQUATICS CENTER - SITE INFRASTRUCTURE AND LANDSCAPE DESIGN

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	GOVT CLASS OR S I F I C A T I O N R E V I E W R	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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		26 24 16.00 40	Continuity Tests	3.2													
			Insulation Tests	3.2													
			SD-07 Certificates														
			Statements	1.2													
			SD-08 Manufacturer's Instructions														
			Panelboards	2.1													
		26 56 00	SD-02 Shop Drawings														
			Luminaire drawings	1.4.1.1	G												
			Poles	1.4.1.2	G												
			SD-03 Product Data														
			Local/Regional Materials	1.6.1													
			Energy Efficiency	1.6.2													
			Luminaires	2.1	G												
			Lamps	2.1.1	G												
			Ballasts	2.1.2	G												
			Lighting contactor	2.2	G												
			Time switch	2.3	G												
			Photocell switch	2.4	G												
			Aluminum poles	2.5.1	G												
			Brackets	2.6													
			SD-04 Samples														
			Luminaires	2.1	G												
			SD-05 Design Data														
			Design Data for luminaires	1.4.2	G												
			SD-08 Manufacturer's Instructions														
			Aluminum poles	2.5.1													

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INDOOR AQUATICS CENTER - SITE INFRASTRUCTURE AND LANDSCAPE DESIGN

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		26 56 00	SD-10 Operation and Maintenance Data														
			Operational Service	1.8													
		31 00 00	SD-01 Preconstruction Submittals														
			Shoring	3.4	G												
			Blasting	1.3.2	G												
			SD-03 Product Data														
			Utilization of Excavated Materials	3.8	G												
			Shoulder Construction	3.14													
			SD-06 Test Reports														
			Testing	3.16													
			SD-07 Certificates														
			Testing	3.16													
		31 05 22	SD-04 Samples														
			Geotextile	2.1.1													
			SD-07 Certificates														
			Geotextile	2.1.1													
		32 01 19	SD-03 Product Data														
			Equipment	1.2													
			SD-04 Samples														
			Materials	1.4.2	G												
		32 05 33	SD-01 Preconstruction Submittals														
			Integrated Pest Management Plan	2.4	G												
			SD-03 Product Data														
			Local/Regional Materials	1.6.1													

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TITLE AND LOCATION INDOOR AQUATICS CENTER - SITE INFRASTRUCTURE AND LANDSCAPE DESIGN						CONTRACTOR											
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		32 05 33	Fertilizer	2.1	G												
			Hose	2.2.1													
			Mulches Topdressing	2.3													
			Organic Mulch Materials	2.3.2													
			SD-07 Certificates														
			Maintenance inspection report	3.4.1													
			Plant quantities	3.4.2	G												
			SD-10 Operation and Maintenance														
			Data														
			Maintenance	1.5.2.2													
			SD-11 Closeout Submittals														
			Tree, staking and guying removal	3.4.3													
		32 11 16	SD-03 Product Data														
			Equipment	1.4													
			SD-06 Test Reports														
			Sampling and Testing	1.6													
			Field Density Tests	1.6.2.4													
		32 13 13.06	SD-03 Product Data														
			Curing materials	2.1.6													
			Admixtures	2.1.4													
			Dowel	2.1.5.1													
			Reinforcement	2.1.5.4													
			Cementitious Materials	2.1.1													
			Aggregate	2.1.3													
			Local/Regional Materials	1.5.1													
			SD-05 Design Data														

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INDOOR AQUATICS CENTER - SITE INFRASTRUCTURE AND LANDSCAPE DESIGN

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		32 13 13.06	mix design	2.3													
			SD-06 Test Reports														
			Aggregate	2.1.3													
			Concrete slump tests	3.7.2													
			Air content tests	3.7.4													
			Compressive strength tests	3.7.3													
			Cementitious materials	2.1.1													
			SD-07 Certificates														
			Ready-mixed concrete plant	1.4.1													
			Batch tickets	1.4.3													
			Cementitious materials	2.1.1													
			SD-11 Closeout Submittals														
			Local/Regional Materials	1.5.1													
			Cementitious Materials	2.1.1													
			Aggregate	2.1.3													
		32 16 13	SD-03 Product Data														
			Concrete	2.1													
			SD-06 Test Reports														
			Field Quality Control	3.8													
		32 17 24.00 10	SD-03 Product Data														
			Equipment	1.2	G												
			Composition Requirements	2.2.1													
			Qualifications	1.4.1													
			SD-06 Test Reports														
			Sampling and Testing	2.5													
		32 84 24	SD-02 Shop Drawings														

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TITLE AND LOCATION						CONTRACTOR											
INDOOR AQUATICS CENTER - SITE INFRASTRUCTURE AND LANDSCAPE DESIGN																	
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		32 84 24	Irrigation sprinkler system	1.2													
			SD-03 Product Data														
			Piping materials	2.1													
			Valves	2.3													
			heads	2.2													
			Backflow preventers	2.3.4													
			Automatic controller	2.5													
			Solvent cement	2.1.4													
			Control wiring	2.6.1													
			Drip irrigation	2.1.7													
			Water meter	2.4.2													
			Tapping tee	2.4.1													
			Valve boxes and lids	3.1.6.3													
			Drip head accessories	2.4.3													
			SD-06 Test Reports														
			tests	1.6.1													
			Backflow preventers	2.3.4													
			Pressure test	3.2.1													
			Operation test	3.2.2													
			SD-07 Certificates														
			Backflow preventers	2.3.4													
			SD-08 Manufacturer's Instructions														
			Automatic controller	2.5													
			heads	2.2													
			Piping materials	2.1													
			Backflow preventers	2.3.4													

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		32 84 24	Valves	2.3													
			Solvent cement	2.1.4													
			Control wiring	2.6.1													
			Drip irrigation	2.1.7													
			Water meter	2.4.2													
			SD-10 Operation and Maintenance														
			Data														
			Piping materials	2.1	G												
			heads	2.2	G												
			Backflow preventers	2.3.4	G												
			Valves	2.3	G												
			Automatic controller	2.5	G												
			Drip irrigation	2.1.7	G												
			Water meter	2.4.2	G												
			SD-11 Closeout Submittals														
			Controller Charts	3.2.3													
			Station Information List	3.2.3													
		32 93 00	SD-01 Preconstruction Submittals														
			State Landscape Contractor's	1.4.3													
			License														
			Time Restrictions and Planting	1.6													
			Conditions														
			SD-03 Product Data														
			Local/Regional Materials	1.8.1													
			Peat	1.5.2.1													
			Mulch	2.5	G												

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INDOOR AQUATICS CENTER - SITE INFRASTRUCTURE AND LANDSCAPE DESIGN

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		32 93 00	Hose	2.10.1													
			Fertilizer	2.3													
			Weed control fabric	1.5.2.4	G												
			Root control barrier	3.1	G												
			Staking Material	2.6.1													
			Metal anchors	2.6.7													
			Antidesiccants	2.8													
			Erosion control materials	2.9													
			SD-04 Samples														
			Decomposed Granite	2.5.1	G												
			Mulch	2.5	G												
			SD-06 Test Reports														
			Topsoil composition tests	1.4.1													
			Percolation Test	1.4.5													
			SD-07 Certificates														
			Nursery certifications	1.4.2													
			Nursery certifications	2.1.1													
		33 11 00	SD-03 Product Data														
			Piping Materials	2.1.1													
			Water distribution main or fire line	2.1													
			distribution main														
			Water service or fire line	2.2													
			Hydrants	2.1.3.4													
			Indicator posts	2.1.3.5													
			Corporation stops	3.1.4.1													
			Valve boxes	2.1.3.6													

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		33 11 00	Valve boxes	2.2.2.5													
			SD-06 Test Reports														
			Disinfection	2.2.2.9													
			SD-07 Certificates														
			Water distribution main	1.2.1													
			Water service line	1.2.2													
			Lining	2.1.1.1													
			hydrants	2.1.3.4													
			SD-08 Manufacturer's Instructions														
			Delivery, storage, and handling	1.4													
			Installation	3.1.1													
			SD-11 Closeout Submittals														
			Recycled Material Content	1.5.1													
		33 30 00	SD-01 Preconstruction Submittals														
			Existing Conditions	1.6													
			SD-02 Shop Drawings														
			Drawings	1.4.2													
			Precast concrete manhole	2.3.1													
			Metal items	2.3.4													
			Frames, covers, and gratings	2.3.4.1													
			SD-03 Product Data														
			Pipeline materials	2.1													
			SD-06 Test Reports														
			Reports	2.4													
			SD-07 Certificates														
			Portland Cement	2.2.2													

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		33 40 00	SD-03 Product Data														
			Placing Pipe	3.3													
			SD-04 Samples														
			Pipe for Culverts and Storm Drains	2.1													
			SD-07 Certificates														
			Hydrostatic Test on Watertight Joints	2.3													
			Determination of Density	3.6.5													
			Frame and Cover for Gratings	2.2.4													
		33 51 15	SD-02 Shop Drawings														
			Pipe, Fittings, and Associated Materials	2.1													
			SD-03 Product Data														
			Materials and Equipment	2.1	G												
			Spare Parts	1.6	G												
			SD-05 Design Data														
			Connections to Existing Lines	3.8	G												
			Jointing of Polyethylene Piping	1.4.1.1	G												
			SD-06 Test Reports														
			Pressure and Leak Tests	3.9.2	G												
			SD-10 Operation and Maintenance Data														
			Gas Distribution System	3.5													
			SD-11 Closeout Submittals														
			Recycled Material Content	1.7.1													

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TITLE AND LOCATION INDOOR AQUATICS CENTER - SITE INFRASTRUCTURE AND LANDSCAPE DESIGN						CONTRACTOR											
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		33 71 02.00 20	SD-02 Shop Drawings														
			Precast underground structures	1.5.1	G												
			SD-03 Product Data														
			Medium voltage cable	2.4	G												
			Medium voltage cable joints	2.6	G												
			Medium voltage cable terminations	2.5	G												
			Live end caps	2.7	G												
			Precast concrete structures	2.12.2.1	G												
			Sealing Material	2.12.2.4													
			Pulling-In Irons	3.4.3													
			Manhole frames and covers	2.12.3	G												
			Handhole frames and covers	2.12.4	G												
			Cable supports	2.13	G												
			SD-06 Test Reports														
			Arc-proofing test	2.15.1	G												
			Arc-proofing test	2.15.1	G												
			Medium voltage cable qualification and production tests	2.15.2	G												
			Field Acceptance Checks and Tests	3.18.1	G												
			Cable Installation Plan and Procedure	3.3													
			SD-07 Certificates														
			Cable splicer/terminator	1.5.2	G												
			Cable Installer Qualifications	1.5.3													

SECTION 01 42 00

SOURCES FOR REFERENCE PUBLICATIONS

05/09

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization, (e.g. ASTM B 564 Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided. Documents listed in the specifications with numbers which were not assigned by the standards producing organization should be ordered from the source by title rather than by number.

ACI INTERNATIONAL (ACI)
38800 Country Club Drive
Farmington Hills, MI 48331
Ph: 248-848-3700
Fax: 248-848-3701
E-mail: bkstore@concrete.org
Internet: <http://www.concrete.org>

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)
444 North Capital Street, NW, Suite 249
Washington, DC 20001
Ph: 202-624-5800
Fax: 202-624-5806
E-Mail: info@aaashto.org
Internet: <http://www.aashto.org>

AMERICAN CONCRETE PIPE ASSOCIATION (ACPA)
222 West Las Colinas Boulevard, Suite 641
Irving, TX 75039-5423
Ph: 972-506-7216
Fax: 972-506-7682
E-mail: info@concrete-pipe.org
Internet: <http://www.concrete-pipe.org>

AMERICAN GAS ASSOCIATION (AGA)
400 North Capitol Street N.W.
Suite 450
Washington, D.C. 20001
Ph: 202-824-7000

Fax: 202-824-7115
E-mail: webmaster@aga.org
Internet: <http://www.aga.org>

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)
One East Wacker Drive
Chicago, IL 60601-1802
Ph: 312-670-2400
Fax: 312-670-5403
Publications: 800-644-2400
E-mail: pubs@aisc.org
Internet: <http://www.aisc.org>

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
1819 L Street, NW, 6th Floor
Washington, DC 20036
Ph: 202-293-8020
Fax: 202-293-9287
E-mail: info@ansi.org
Internet: <http://www.ansi.org/>

AMERICAN PETROLEUM INSTITUTE (API)
1220 L Street, NW
Washington, DC 20005-4070
Ph: 202-682-8000
Fax: 202-682-8223
Internet: <http://www.api.org>

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)
1800 East Oakton Street
Des Plaines, IL 60018-2187
Ph: 847-699-2929
Fax: 847-768-3434
E-mail: customerservice@asse.org
Internet: <http://www.asse.org>

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)
901 Canterbury, Suite A
Westlake, OH 44145
Ph: 440-835-3040
Fax: 440-835-3488
E-mail: info@asse-plumbing.org
Internet: <http://www.asse-plumbing.org>

AMERICAN WATER WORKS ASSOCIATION (AWWA)
6666 West Quincy Avenue
Denver, CO 80235
Ph: 800-926-7337
Fax: 303-347-0804
Internet: <http://www.awwa.org>

AMERICAN WELDING SOCIETY (AWS)
550 N.W. LeJeune Road
Miami, FL 33126
Ph: 800-443-9353 - 305-443-9353
Fax: 305-443-7559
E-mail: info@aws.org
Internet: <http://www.aws.org>

ASME INTERNATIONAL (ASME)
Three Park Avenue, M/S 10E
New York, NY 10016
Ph: 212-591-7722 or 800-843-2763
Fax: 212-591-7674
E-mail: infocentral@asme.org
Internet: <http://www.asme.org>

ASSOCIATION OF EDISON ILLUMINATING COMPANIES (AEIC)
600 North 18th Street
P.O. Box 2641
Birmingham, AL 35291
Ph: 205-257-2530
Fax: 205-257-2540
Internet: <http://www.aeic.org>

ASTM INTERNATIONAL (ASTM)
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959
Ph: 610-832-9500
Fax: 610-832-9555
E-mail: service@astm.org
Internet: <http://www.astm.org>

CSA AMERICA INC (CSA/AM)
8501 East Pleasant Valley Road
Cleveland, OH 44131-5575
Ph: 216-524-4990
Fax: 216-520-8979
E-mail: cathy.rake@csa-america.org
Internet: <http://www.csa-america.org>

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
933 North Plum Grove Road
Schaumburg, IL 60173-4758
Ph: 847-517-1200
Fax: 847-517-1206
Internet: <http://www.crsi.org/>

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-- End of Section --

SECTION 01 45 00.00 10

QUALITY CONTROL
02/10

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 3740 (2008) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

ASTM E 329 (2009) Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all associated costs will be included in the applicable Bid Schedule unit or lump-sum prices.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Establish and maintain an effective quality control (QC) system in compliance with the Contract Clause titled "Inspection of Construction." QC consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. Cover all construction operations, both onsite and offsite, and be keyed to the proposed construction sequence. The project superintendent will be held responsible for the quality of work and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract. In this context the highest level manager responsible for the overall construction activities at the site, including quality and production is the project superintendent. The project superintendent must maintain a physical presence at the site at all times and is responsible for all construction and related activities at the site, except as otherwise acceptable to the Contracting Officer.

3.2 QUALITY CONTROL PLAN

Submit no later than 14 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the

requirements of the Contract Clause titled "Inspection of Construction." The Government will consider an interim plan for the first 30 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional work.

3.2.1 Content of the CQC Plan

Include, as a minimum, the following to cover all construction, construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agentssubcontractors, designers of record, consultants, architect/engineers (AE), fabricators, suppliers, and purchasing agents:

- a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff will implement the three phase control system for all aspects of the work specified. Include a CQC System Manager who reports to the project superintendent.
- b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.
- c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities will be issued by the CQC System Manager. Copies of these letters must be furnished to the Government.
- d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agentssubcontractors, designers of record, consultants, architect engineers (AE), offsite fabricators, suppliers, and purchasing agents. These procedures must be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.
- e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by the Contracting Officer must be used.)
- f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.
- g. Procedures for tracking construction design and construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.

- h. Reporting procedures, including proposed reporting formats.
- i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

3.2.2 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.3 Notification of Changes

After acceptance of the CQC Plan, notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, Postaward Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. Submit the CQC Plan a minimum of 14 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details must be developed, including the forms for recording the CQC operations operations, design activities, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting will be prepared by the Government, signed by both the Contractor and the Contracting Officer and will become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure safety and contract compliance. The Safety and Health Manager must receive direction and authority from the CQC System Manager and serve as a member of the CQC staff. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff must maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any

action necessary to ensure contract compliance. The CQC staff will be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly complete and furnish all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization who is responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager must be a construction person with a minimum of 15 years in related work. This CQC System Manager must be on the site at all times during construction and be employed by the prime Contractor. The CQC System Manager must be assigned no other duties. Identify in the plan an alternate to serve in the event of the CQC System Manager's absence. The requirements for the alternate are the same as the CQC System Manager.

3.4.3 Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager must have completed the course entitled "Construction Quality Management For Contractors"..

3.4.4 Organizational Changes

Maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, must comply with the requirements in Section 01 33 00 SUBMITTAL PROCEDURES. The CQC organization is responsible for certifying that all submittals and deliverables are in compliance with the contract requirements.

3.6 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control must be conducted by the CQC System Manager for each definable feature of the construction work as follows:

3.6.1 Preparatory Phase

This phase is performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase includes:

- a. A review of each paragraph of applicable specifications, reference codes, and standards. Make available during the preparatory inspection a copy of those sections of referenced codes and

standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by Government personnel until final acceptance of the work.

- b. Review of the contract drawings.
- c. Check to assure that all materials and/or equipment have been tested, submitted, and approved.
- d. Review of provisions that have been made to provide required control inspection and testing.
- e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.
- f. Examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.
- g. Review of the appropriate activity hazard analysis to assure safety requirements are met.
- h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.
- i. Check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.
- j. Discussion of the initial control phase.
- k. The Government must be notified at least 72 hours in advance of beginning the preparatory control phase. Include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase is accomplished at the beginning of a definable feature of work. Accomplish the following:

- a. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.
- b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.
- c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.
- d. Resolve all differences.

- e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
- f. The Government must be notified at least 72 hours in advance of beginning the initial phase. Prepare separate minutes of this phase by the CQC System Manager and attach to the daily CQC report. Indicate the exact location of initial phase for future reference and comparison with follow-up phases.
- g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. Record the checks in the CQC documentation. Conduct final follow-up checks and correct all deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. Procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. Perform the following activities and record and provide the following data:

- a. Verify that testing procedures comply with contract requirements.
- b. Verify that facilities and testing equipment are available and comply with testing standards.
- c. Check test instrument calibration data against certified standards.
- d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
- e. Record results of all tests taken, both passing and failing on the CQC report for the date taken. Specification paragraph reference,

location where tests were taken, and the sequential control number identifying the test. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel must meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed a charge of \$250.00 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4 Furnishing or Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials will be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government must be delivered to the Corps of Engineers Division Laboratory, f.o.b., at the following address:

For delivery by mail: TBD

For other deliveries: TBD

Coordination for each specific test, exact delivery location, and dates will be made through the Area Office.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Conduct an inspection of the work by the CQC Manager near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications. Prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications, as required by paragraph

DOCUMENTATION. Include within the list of deficiencies the estimated date by which the deficiencies will be corrected. Make a second inspection the CQC System Manager or staff to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2 Pre-Final Inspection

The Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. Ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. These inspections and any deficiency corrections required by this paragraph must be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative must be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notify the Contracting Officer at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9 DOCUMENTATION

Maintain current records providing factual evidence that required quality control activities and/or tests have been performed. Include in these records the work of subcontractors and suppliers on an acceptable form that includes, as a minimum, the following information:

- a. Contractor/subcontractor and their area of responsibility.
- b. Operating plant/equipment with hours worked, idle, or down for repair.
- c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.
- d. Test and/or control activities performed with results and references to specifications/drawings requirements. Identify the control phase (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.

- e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.
- g. Offsite surveillance activities, including actions taken.
- h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- i. Instructions given/received and conflicts in plans and/or specifications.
- j. Contractor's verification statement.

Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and deficient features and include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. Furnish the original and one copy of these records in report form to the Government daily within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, prepare and submit one report for every 7 days of no work and on the last day of a no work period. All calendar days must be accounted for throughout the life of the contract. The first report following a day of no work will be for that day only. Reports must be signed and dated by the CQC System Manager. Include copies of test reports and copies of reports prepared by all subordinate quality control personnel within the CQC System Manager Report.

3.10 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, will be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders will be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

-- End of Section --

SECTION 01 56 20

DUST CONTROL FOR FORT BLISS
6/2003

PART 1 GENERAL

1.1 SUMMARY

The work covered by this section consists of furnishing all labor, materials and equipment and performing all work required for the control and prevention of fugitive dust during and as the result of construction operations under this Contract except for those measures set forth in other Technical Provisions of these specifications. For the purpose of this specification, fugitive dust entails the generation of solid particles by the forces of wind or machinery acting upon exposed materials. Provisions of this specification shall prevent fugitive dust from adversely affecting human health or welfare; unfavorably altering ecological balances of importance to human life; affecting other species of importance to man; or degrading the utility of the environment for aesthetic and recreational purposes. The Contractor shall submit an effective dust control method for the arid region.

1.2 REFERENCES

The publications listed below form a part of this section to the extent referenced. The publications are referenced in the text by basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2003) Safety -- Safety and Health Requirements

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Dust Control; G.
Products and Procedures; G

Prior to commencement of the work, the Contractor shall submit in writing a proposal to the Contracting Officer for implementing the provisions of this Section for fugitive dust control. The Contractor shall address by submittal the plans to prevent and control fugitive dust through specific mitigative and preventative measures, including any products to be used. The effectiveness of the dust control program shall be periodically checked and reviewed. Revisions to the dust control plan shall be submitted to the Contracting Officer as changes are necessary during the

duration of this Contract.

SD-02 Shop Drawings

Recordkeeping

Maintain and furnish records in accordance with PART 1 paragraph RECORDKEEPING.

1.4 IMPLEMENTATION MEETING

Prior to commencement of the work the Contractor shall meet with representatives of the Contracting Officer to develop mutual understandings relative to compliance with these provisions and administration of the dust control program in accordance with Section 01310 PROJECT MEETINGS in the MATOC Contract.

1.4 APPLICABLE REGULATIONS

In order to prevent and to provide control of pollution arising from the construction activities of the Contractor and his subcontractors in the performance of this Contract, all applicable Federal, State, and local laws and regulations concerning environmental pollution control and abatement, and all applicable provisions of the EM 385-1-1 as well as the specific requirements stated in this section and elsewhere in the Contract specifications. Compliance with the provisions of this Section by subcontractors will be the responsibility of the Contractor.

1.5 NOTIFICATION OF NON-COMPLIANCE

The Contracting Officer will notify the Contractor in writing of any observed non-compliance with the foregoing provisions. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails or refuses to promptly take corrective action, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it was later determined that the Contractor was in compliance.

1.6 RECORDKEEPING

The Contractor shall, at a minimum, maintain records indicating dust control measures taken. Information provided shall be sufficient to answer any questions regarding control methods utilized, products used, application rates, inspections performed. Additional information to be recorded, but not limited to reporting, includes treated area, operator, date and time of treatment, meteorological conditions and inspection and monitoring reports. Records shall be submitted every 30 days to the Contracting Officer.

PART 2 PRODUCTS

2.1 PRODUCTS AND PROCEDURES

Products and procedures used in controlling particulates and dust shall be

in accordance with the Contractor's Environmental Protection Plan and the dust control plan required by this Section. If the Contractor proposes to use chemical treatments or other manufactured products such as SOIL CEMENT, prior approval by the Fort Bliss Directorate of Environment is required and shall be obtained by submitting a written request to the Contracting Officer's Representative.

PART 3 EXECUTION

3.1 DUST CONTROL

Control techniques for fugitive dust sources shall involve watering, chemical treatment, light bituminous treatment, reduction of surface wind speed with wind breaks or source enclosures, or similar methods. The methods utilized shall be cost effective and appropriate for the size and scope of the fugitive dust source. Methods and controls shall not have an adverse effects on plant and animal life, or contaminate the treated material.

Methods shall be repeated at such intervals as to keep all parts of the disturbed area treated at all times, and the Contractor shall have sufficient competent equipment on the job to accomplish control techniques. Products shall provide a method to reduce dust-related environmental concerns and aid in complying with applicable regulations. Products shall not in any form produce any adverse environmental effects through their use and shall provide an effective, clean, safe control of airborne dust and protection against soil erosion.

3.1.1 Preventative Techniques

The reduction of source extent, the incorporation of process modifications, or adjusted work practices, which reduce the amount of dust-generation, are preventative techniques for the control of fugitive dust emissions. These techniques could include, for example, the elimination of mud and dirt carry-out onto paved roads at construction sites.

3.1.2 Mitigative Techniques

Mitigative measures entail the periodic removal of dust-producing material. Examples of mitigative control measures include clean-up of spillage on paved or unpaved travel surfaces and clean-up of material spillage at transfer points.

3.2 MATERIALS HANDLING

The Contractor shall take the following minimum precautions to limit fugitive dust emissions from material handling and transportation to achieve control of dust emissions to the extent practicable:

a. Stockpiles

The Contractor shall apply water or other approved suitable chemicals or materials, or cover material stockpiles and other surfaces which can create airborne dust.

b. Transportation

At a minimum, complete covering of materials hauled from the construction site in open-bed vehicles which can create airborne particulate matter is

required. Additional application of water, suitable chemicals, or maintaining a minimum 12 inch free-board space shall be required if additional controls are considered necessary by the Contracting Officer.

c. Off-Site Tracking

Dust control shall be performed as the work proceeds to minimize vehicle off-site tracking of sediment and generation of dust. Every effort shall be made to keep vehicles from tracking soils from the construction site. Dust generation shall be controlled by sprinkling, chemical treatment, light bituminous treatment, or similar approved methods.

3.3 CONSTRUCTION AND DEMOLITION

Environmental conditions at Fort Bliss can create dispersion of dust during construction. The Contractor shall control dust resulting from demolition and construction activities. For the purpose of this section, the following restrictions apply if the area of land affected by the listed activities is more than one acre in size. No person may cause, suffer, allow, or permit a structure, road, street, alley, or parking area to be constructed, altered, repaired, or demolished, or land to be cleared without taking minimum precautions to achieve control of dust emissions.

3.3.1 Demolition

The amount of dust resulting from demolition shall be controlled to prevent the spread of dust to occupied portions of the construction site and to avoid creation of a nuisance in the surrounding area. The use of water, oil or chemical treatment for control of dust in the demolition of structures, in construction operations, in work performed on a road, parking area, or in the clearing of land is required.

3.3.2 Sandblasting

Adequate methods such as wet-sandblasting and enclosure of work areas to prevent airborne particulate matter during sandblasting of structures or other similar operations shall be utilized.

3.4 ACCESS ROADS AND PARKING LOTS

No person may cause, suffer, allow, or permit any public, industrial, commercial, or private road, street, or alley to be used without taking precautions to achieve control of dust emissions.

In addition to preventative techniques, the removal of soil or other materials shall be periodically performed by mechanical sweepers or their equivalent. The Contractor shall also spot clean dirty roadways and parking lots. These activities shall be performed every 90 days or as determined necessary by the Contracting Officer. Sand applied for the specific purpose of snow or ice control shall be removed as soon as such control is no longer necessary.

3.4.1 Access Roads

The use of asphalt or other paving materials is the only acceptable method of dust control for roads leading to and from the area of construction activity, unless otherwise specified. Water, suitable oil, or approved chemical applications to construction and demolition site access roads may be used if accepted by the Contracting Officer. An exception from the

Contracting Officer from the requirement to pave a roadway may be granted if the Contractor demonstrates that the cost of paving is economically unreasonable compared to other methods of dust control.

3.4.2 Parking Lots

No person may allow any vehicular parking surface having more than five parking spaces to be used unless dust is controlled by the appropriate application of asphalt, water, or suitable oil or chemicals.

Parking surfaces with more than five parking spaces shall be paved or uniformly covered with gravel. This provision shall not apply to temporary parking lots used for less than one month, after which access is prohibited unless a continuance is granted by the Contracting Officer. Such temporary lots shall be required to apply water or suitable oil or chemical. Lots with more than 100 parking spaces shall be paved or covered by an equivalent method approved by the Contracting Officer.

3.5 CONTROL STRUCTURES

Activities performed under this Contract shall conform with the specifications described herein along with other technical specifications, particularly Section 01 57 20.00 10 ENVIRONMENTAL PROTECTION contained in the Master MATOC Contract.

If the Contractor proposes to construct temporary structures, he shall submit the proposal for approval at least ten (10) days prior to the scheduled start of such temporary work. Modification of the Contractor's plans shall be made only with the written approval of the Contracting Officer.

3.6 MAINTENANCE

During the life of this Contract, the Contractor shall maintain all facilities constructed for pollution control under this Contract as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

During the construction period the Contractor shall conduct frequent training courses for his maintenance personnel. The curricula shall include methods of dust control, familiarity with pollution standards, and care of controls and measures to prevent and correct fugitive dust pollution.

The Contractor shall furnish daily services for the temporary control measures at the project site and perform any required maintenance as deemed necessary by and to the satisfaction of the Contracting Officer during the entire life of the Contract. Services shall be performed at such a time and in such a manner to least interfere with the operations.

The Contractor's Quality Control Organization shall inspect all pollution prevention measures at least once every seven days or at the Contracting Officer's request.

3.7 MONITORING

Dust control plans should include provisions to monitor the efficiency of the program. Monitoring shall be provided at the Contracting Officer's

request if visible emissions from the construction location regularly occur. Use of PM-10 Monitors per US EPA Reference Method for PM-10 (RFPS-0694-098) or approved equivalent shall be used to monitor upwind and downwind concentrations to show performance of dust control measures. Downwind samples shall not exceed Ambient Air Quality Standards for PM-10 sampling over a 24 hour period.

-- End of Section --

SECTION 01 57 23

TEMPORARY STORM WATER POLLUTION CONTROL

04/08

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 4439	(2004) Geosynthetics
ASTM D 4491	(1999a; R 2004e1) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(2004) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(2008) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(2004) Determining Apparent Opening Size of a Geotextile
ASTM D 4873	(2002) Identification, Storage, and Handling of Geosynthetic Rolls and Samples

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 832-R-92-005	(1992) Storm Water Management for Construction Activities Developing Pollution Preventions and Plans and Best Management Practices
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U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 122.26	Storm Water Discharges (Applicable to State NPDES Programs, see section 123.25)
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1.2 SYSTEM DESCRIPTION

The work consists of implementing the storm water pollution prevention measures to prevent sediment from entering streams or water bodies as specified in this Section in conformance with the requirements of Section 01 57 20.00 10 ENVIRONMENTAL PROTECTION contained in the Master MATOC Contract, and the requirements of the National Pollution Discharge Elimination System (NPDES) permit attached to that Section.

1.3 EROSION AND SEDIMENT CONTROLS

The controls and measures required of the Contractor are described below.

1.3.1 Stabilization Practices

The stabilization practices to be implemented include temporary seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, erosion control matts, protection of trees, preservation of mature vegetation, . On the daily CQC Report, record the dates when the major grading activities occur, (e.g., clearing and grubbing, excavation, embankment, and grading); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Except as provided in paragraphs UNSUITABLE CONDITIONS and NO ACTIVITY FOR LESS THAN 21 DAYS, initiate stabilization practices as soon as practicable, but no more than 14 days, in any portion of the site where construction activities have temporarily or permanently ceased.

1.3.1.1 Unsuitable Conditions

Where the initiation of stabilization measures by the fourteenth day after construction activity temporarily or permanently ceases or is precluded by unsuitable conditions caused by the weather, initiate stabilization practices as soon as practicable after conditions become suitable.

1.3.1.2 No Activity for Less Than 21 Days

When the total time period in which construction activity is temporarily ceased on a portion of the site is 21 days minimum, stabilization practices do not have to be initiated on that portion of the site until 14 days have elapsed after construction activity temporarily ceased.

1.3.1.3 Burnoff

Burnoff of the ground cover is not permitted.

1.3.1.4 Protection of Erodible Soils

Immediately finish the earthwork brought to a final grade, as indicated or specified, and protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.

1.3.2 Erosion, Sediment and Stormwater Control

a. Submit a Storm Water Notice of Intent for NPDES coverage under the general permit for construction activities and a Storm Water Pollution Prevention Plan (SWPPP) for the project to the Contracting Officer prior to the commencement of work. The SWPPP shall meet the requirements of the State of TX general permit for storm water discharges from construction sites. Submit the SWPPP along with any required Notice of Intents, Notice of Termination, and appropriate permit fees, via the Contracting Officer, to the appropriate Federal and State agencies for approval, a minimum of 14 calendar days prior to the start of any land disturbing activities. Maintain an approved copy of the SWPPP at the construction on-site office, and continually update as regulations require, to reflect current site conditions. Include within the SWPPP:

(1) Identify potential sources of pollution which may be reasonably expected to affect the quality of storm water discharge from the site.

(2) Describe and ensure implementation of practices which will be used to reduce the pollutants in storm water discharge from the site.

(3) Ensure compliance with terms of the State of TX general permit for storm water discharge.

(4) Select applicable best management practices from EPA 832-R-92-005.

(5) Include a completed copy of the Registration Statement, BMP Inspection Report Template and Notice of Termination except for the effective date.

(6) Storm Water Pollution Prevention Measures and Notice of Intent 40 CFR 122.26, EPA 832-R-92-005. Provide a "Storm Water Pollution Prevention Plan" (SWPPP) for the project. The SWPPP will meet the requirements of the EPA State of TX general permit for storm water discharges from construction sites. Submit the SWPPP along with any required Notice of Intent, Notice of Termination, and appropriate permit fees, via the Contracting Officer, to the appropriate Federal and State agencies for approval, a minimum of 14 calendar days prior to the start of construction. A copy of the approved SWPPP will be kept at the construction on-site office, and continually updated as regulations require to reflect current site conditions.

1.3.3 Structural Practices

Implement structural practices to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Implement structural practices in a timely manner, during the construction process, to minimize erosion and sediment runoff.

1.3.3.1 Silt Fences

Provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Properly install silt fences to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation, embankment, and grading). Install silt fences in the locations indicated on the drawings. Obtain approval from the Contracting Officer prior to final removal of silt fence barriers.

1.3.3.2 Diversion Dikes

Build diversion dikes with a maximum channel slope of 2 percent and adequately compacted to prevent failure. The minimum height measured from the top of the dike to the bottom of the channel shall be 18 inches. The minimum base width shall be 6 feet and the minimum top width shall be 2 feet. Ensure that the diversion dikes are not damaged by construction operations or traffic. Locate diversion dikes where shown on the drawings.

1.3.3.3 Construction Entrances

Construction entrances shall be provided at all entrances to work areas from paved roadways. The intent of the construction entrances is to dislodge loose dirt from vehicles prior to entering roadways. Construction

entrances shall be as detailed in the Construction Drawings. The presence of construction entrances does not relieve the Contractor of the requirement to keep the adjacent roadways clear of dirt and debris.

1.3.3.4 Rock Berms and Siltation Structures

Rock berms and siltation structures shall be used to dissipate velocity and prevent sediment from entering the retention basins. Rock berms shall be constructed as detailed in the Construction Drawings. The presence of rock berms and siltation structures does not relieve the Contractor of the responsibility to keep the retention basins free of siltation.

1.3.3.5 Rock Rip Rap

Rock rip rap shall be as specified in Section 31 00 00, EARTHWORK.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Storm Water Pollution Prevention Plan
Storm Water Notice of Intent

Pollution prevention plan and Notice of intent for NPDES coverage under the general permit for construction activities

SD-07 Certificates

Mill Certificate or Affidavit

Certificate attesting that the Contractor has met all specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

Identify, store and handle filter fabric in accordance with ASTM D 4873.

PART 2 PRODUCTS

2.1 COMPONENTS FOR SILT FENCES

2.1.1 Filter Fabric

Provide geotextile that complies with the requirements of ASTM D 4439, and consists of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. The filament shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of ester, propylene, or amide, and contains stabilizers and/or inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultraviolet and heat exposure. Provide synthetic filter fabric that contains ultraviolet ray inhibitors and stabilizers to assure a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F. The filter fabric shall meet the following requirements:

FILTER FABRIC FOR SILT SCREEN FENCE

PHYSICAL PROPERTY	TEST PROCEDURE	STRENGTH REQUIREMENT
Grab Tensile	ASTM D 4632	100 lbs. min.
Elongation (percent)		30 percent max.
Trapezoid Tear	ASTM D 4533	55 lbs. min.
Permittivity	ASTM D 4491	0.2 sec-1
AOS (U.S. Std Sieve)	ASTM D 4751	20-100

2.1.2 Silt Fence Stakes and Posts

Use steel posts (standard "U" or "T" section) utilized for silt fence construction, shall have a minimum weight of 1.33 pounds/linear foot and a minimum length of 5 feet.

2.1.3 Mill Certificate or Affidavit

Provide a mill certificate or affidavit attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified above. Specify in the mill certificate or affidavit the actual Minimum Average Roll Values and identify the fabric supplied by roll identification numbers. The Contractor shall submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric.

PART 3 EXECUTION

3.1 Stormwater Pollution Prevention Plan

Contractor shall prepare, implement, and maintain a Stormwater Pollution Prevention Plan (SWPPP) at all times during the project. The plan shall be submitted to the USACE Area Office and Fort Bliss Directorate of Environment (DOE) for approval prior to beginning construction activities. The requirements of this Section and those shown on the Contract Drawings are the minimum required elements. Additional measures may be required to fully comply with applicable State and Federal Laws.

The Contractor shall be solely responsible for the submission of all forms and associated fees including, but not limited to the Notice of Intent, Construction Site Notice, Monthly Inspection Forms, Notice of Change, and Notice of Termination.

3.2 INSTALLATION OF SILT FENCES

Extend silt fences a minimum of 24 inches above the ground surface without exceeding 34 inches above the ground surface. Provide filter fabric from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, splice together filter fabric at a support post, with a minimum 36 inch overlap, and securely sealed. Excavate trench approximately 8 inches wide and 8 inches deep on the upslope side of the location of the silt fence. The 8 by 8 inch trench shall be backfilled and the soil compacted over the filter fabric. Remove silt fences upon approval by the Contracting Officer.

3.3 FIELD QUALITY CONTROL

Maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. Use the following procedures to maintain the protective measures.

3.3.1 Silt Fence Maintenance

Inspect the silt fences in accordance with paragraph, titled "Inspections," of this section. Any required repairs shall be made promptly. Pay close attention to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, replace the fabric promptly. Remove sediment deposits when deposits reach one-third of the height of the barrier. Remove a silt fence when it is no longer required. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall receive erosion control .

3.3.2 Diversion Dike Maintenance

Inspect diversion dikes in accordance with paragraph, titled "Inspections," of this section. Pay close attention to the repair of damaged diversion dikes and accomplish necessary repairs promptly. When diversion dikes are no longer required, shape to an acceptable grade.

3.4 INSPECTIONS

3.4.1 General

Inspect disturbed areas of the construction site, areas that have not been finally stabilized used for storage of materials exposed to precipitation, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site. Conduct inspections at least once every month where sites have been finally stabilized.

3.4.2 Inspections Details

Inspect disturbed areas and areas used for material storage that are exposed to precipitation for evidence of, or the potential for, pollutants entering the drainage system. Observe erosion and sediment control measures identified in the Storm Water Pollution Prevention Plan to ensure that they are operating correctly. Inspect discharge locations or points to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Inspect locations where vehicles exit the site for evidence of offsite sediment tracking.

3.4.3 Inspection Reports

For each inspection conducted, prepare a report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the Storm Water Pollution Prevention Plan, maintenance performed, and actions taken. Furnish the report to the

Contracting Officer within 24 hours of the inspection as a part of the Contractor's daily CQC REPORT. A copy of the inspection report shall be maintained on the job site.

3.4.4 Monthly Inspection Report and Certification Form

On the first working day of each month, the Contractor shall complete, sign, and submit the original form, on the first working day of each month, to the Texas Environmental Quality Commission, Office of Pollution Control (OPC) at the following address:

Stormwater & Prevention Team, ONC-228
P.O. Box 13087
Austin, Texas 78711-3087

A copy of the TCEQ's Monthly Inspection Report and Certification Form for Erosion and Sediment Controls is available from the Fort Bliss Directorate of Environment. Also furnish, on the first working day of each month, one copy of the form submitted to the TCEQ to Fort Bliss DOE and to the Contracting Officer as part of the Contractor's daily CQC Report and attach a copy of the completed form to the Plan. Unless otherwise notified by the TCEQ or Fort Bliss DOE, the Contractor shall submit the Monthly Inspection Report and Certification Forms for an additional two months after the final completion of all storm water pollution prevention measures required in this contract have been implemented.

-- End of Section --

SECTION 01 57 24.00 44

STORM WATER POLLUTION PREVENTION PLAN
06/2006

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 110 Protection of Environment: Subchapter
D--WATER PROGRAMS, Discharge of Oil

40 CFR 112 Oil Pollution Prevention

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

The Storm Water Pollution Prevention Plan (SWPPP) included as Appendix "A" is hereby incorporated as part of the construction documents and shall be the SWPPP which the construction contractor will follow.

The contractors may elect to provide more stringent measures but any deviation must be approved by the Government.

Storm Water Pollution Prevention Plan (SWPPP or SWP3); G

The construction Contractor site specific SWPPP shall prevent erosion, sediment loss from the construction site, and erosion down gradient of the developed property. To the maximum extent possible, the SWPPP shall (a) limit area of disturbance to minimize soil loss and sediment polluting water quality impaired receiving waters down gradient from construction site, (b) incorporate staged seeding or re-vegetation (by solid sod turfing on graded slope as work progress.

(1) The SWPPP shall comprise of three (3) major parts: (a) narrative (b) drawings depicting structural and non-structural best management practices (BMP) (c) Storm Water Permit required documentations (attachments and worksheets) for record-keeping (see PART 12).

(2) The Contractor construction SWPPP shall consider project

phasing, timing of controls and activities, divert storm water run on disturbed site, limit area of exposed soil, and retain sediments from exposed site.

(3) The SWPPP drawings shall be prepared on site grading plans. It shall include four phases or stages of Best Management Practices (BMP) structures layout: (a) initial BMP at site & construction support facilities prior to site clearing and grubbing, (b) interim BMP during grading activities, and (c) temporary stabilization method and locations, and (d) final stabilization method and locations of application. Notes on Timing Controls and Activities shall be depicted on SWPPP drawings.

(4) The contract drawings depicted are recommended or suggested BMP types and locations. The recommended BMP layouts shall be verified at job site before preparation of construction Contractor site activities and operation specific SWPPP.

(5) The SWPPP shall be prepared by a registered engineer who has experience in construction storm water permit, sediment and erosion control best management practices (BMP). **The BMP layout, Notes for Timing of Controls and Activities shall be prepared by a Certified Professional in Erosion and Sediment Control (CPESC) who has 2-day refresher training offered by recognized professionals in the industry, such as (www.ieca.org) or Storm Water Management Permitting and Regulatory Overview (ENV214), see info on www.teex.org/env/environmental, or EPA NPDES construction storm water permit BMP tools.** The SWPPP preparer shall have at least three (3) years of experience in preparing SWPPP, training in cost effective, feasible, and sustainable BMP. The SWPPP preparer shall provide training certificates.

(6) The Construction contractor designated inspector responsible for compliance of storm water permit and permit required activities shall attend at least 2-day training on storm water erosion and sediment control provided by EPA, state, and vendors such as www.ieca.org, EPA NPDES construction storm water , TEXAS A&M Environmental Extension Services. The inspector shall provide training certificates from accredited vendors. Storm Water Management Permitting and Regulatory Overview (ENV214), and Storm water Industrial Activities "Qualified Personnel" Training (ENV247) is available on www.teex.org/env/environmental.

(7) The CPESC shall provide Briefing on the approved Construction Operation SWPPP to all on-site workers.

(8) During construction (after the USACE approved of construction operation SWPPP), SWPPP or BMP revision is required when site conditions change and that may cause potential permit incompliance. The SWPPP or BMP revision shall be initiated when requested by the Area Office Contracting Officer (AOCO) or after inspection conducted by the Contractor designated inspector in every 14-day period and after each storm event of 0.5 inches or greater.

(9) The SWPPP shall not be submitted to the Corps unless it has been verified to meet requirements of the state Construction Storm Water Permit and checklist as appended herein. Prior to submitting the Notice of Intent (NOI) (verify if it is required),

the construction operation SWPPP shall be approved by the Corps.

(10) The NOI shall be separately submitted by the construction Contractor and the USACE as co-operators of the construction site.

(11) The construction firm executing officer shall sign the Certification of SWPPP, the delegation letter of signatory authorization, the Notice of Intent (NOI), and the Notice of Termination (NOT).

(12) List of Regulated Materials, Construction Materials and Products, Location, Method of Containment, and MSDS.

(13) List of Wastes, Location and Method of Containment, and Type of Wastes for Recycling.

(14) The SWPPP shall adopt LOW IMPACT DEVELOPMENT or green design solutions. Phase II construction storm water permit (EPA NPDES and TPDES General Permit No.TXR150000) requires Low Impact Development to minimize post construction site erosion. Reference <http://www.epa.gov/owow/nps/lid/>

(15) The SWPPP shall ensure no post construction erosion along outfall channels. (i.e. Scour Stop or equal at initial velocity dissipation, protection bottom and sides of down gradient channels and overlayment of composite fiber turf reinforcement mats (TRM) or equal), disturbed slopes and drainage channels, as soon as rough grading is in-place.)

The following shall be depicted on SWPPP drawings.

(a) Location of fuel storage tank and/or fuel transfer point, and BMP construction detail

(b) A statement that verifies an emergency spill clean-up kit, spill containment device is at fuel transfer points at all times.

(c) A statement that verifies fuel tanks or fueling trucks have overfill protection devices.

(d) Location of Concrete wash-out pit, BMP construction detail

(e) Location of On-site or off-site contractor laydown, storage, stockpile, borrow, spoil, parking areas, drainage features, and BMP construction details

(f) Location of batch plant, drainage features, and BMP construction details

(h) Location of stabilized construction access, BMP construction detail (NOTE: Use temporary asphalt access roadway for site of 10 acres or larger and/or construction period extends longer than three months)

SD-11 Closeout Submittal

Notice of Termination; G, PER-EE

A copy of the original Notice of Termination (NOT) shall be

submitted to the regulatory agency (TCEQ, EPA, or respective regulatory agency). Prior to submittal of NOT, Contractor shall inspect finished site with Area Office Contracting Officer (AOCO), obtain photographs to proof establishment of final soil stabilization and removal of BMP controls. A copy of NOT shall be provided to PER-EE (ATTN: Kathy Mitchell) through the AOCO. The construction Contractor shall retain all documents pertaining to Construction Storm Water Permit for at least three (3) years after NOT submittal.

1.3 SUMMARY

The Contractor shall prepare a project applicable SWPPP (include narrative, BMP recommended or suggested layout drawings) that meets the Texas Pollutant Discharge Elimination System (TPDES) and requirements in this section for construction contractor submittal of a site specific SWPPP.

Copies of the general permit for storm water discharge, NOI and NOT forms, and instructions are available at the following web site:

http://www.tceq.state.tx.us/nav/permits/sw_permits.html
(PERMIT NO. TXR 150000 for large or small construction site)

A copy of applicable permit for the construction site shall include in the SWPPP and submit for the Corps review and approval (PER-DD).

There is no separate payment for work required in this section.

1.4 PROJECT IDENTIFICATION

PROJECT TITLE: _____

LOCATION: Fort Bliss, Texas

1.5 PROJECT DESCRIPTION

The SWPP shall discuss project construction activities and total disturbed areas. It is necessary to describe all disturbed areas on-site and each detached (off-site) location for new construction and demolition. The project total disturbed area shall include areas within the limit of construction, contractor staging, material stockpile, overburden, and material borrow area, and batch plant. The project off-site location shall include (1) demolition, (2) material storage, overburden and stockpiled material, and borrow areas, and (3) utility trenches and new facilities. It shall identify each location and determine the total disturbed areas.

1.6 BID OPTIONS AND PROJECT PHASING

The SWPP shall address phasing and option requirements.

1.7 STANDARD INDUSTRIAL CLASSIFICATION (SIC)

1521 General Contractors - Single Family Houses

1522 - General Contractors - Residential Buildings, other than Single Family (i.e. barracks)

1541 - General Contractors - Industrial Buildings and Warehouses

1542 - General Contractors - Non-Residential Building, other than Industrial Buildings and Warehouses (i.e. administrative buildings)

1611 - Highways and Street Construction, Except Elevated Highways

1623 - Water, Sewer, Pipeline, and Communications and Power Line Construction

1629 - Heavy Construction, Not Elsewhere Classified (i.e. athletic fields, cofferdams, dikes, boat docks, railroads, reservoirs, water or sewage treatment plant)

1771 - Concrete Work (includes asphalt, i.e. access drives and parking lots, culvert construction)

1794 - Excavation Work (include trenching and earth moving)

4581 - Airports, Flying Fields, and Airport Terminal Services

7033 - Recreational Vehicle Parks and Campsites

7538 - General Automotive Repair Shops

7699 - Repair Shops and Related Services, Not Elsewhere Classified (i.e. military equipment repair, machinery cleaning)

7999 - Amusement and Recreation Services, Not Elsewhere Classified (i.e. beaches, fishing piers, picnic grounds)

8062- General Medical and Surgical Hospitals

9711 - National Security (a general category for military facilities)

1.8 LOCATION

The SWPPP shall give a narrative of project location, including street names or easily recognized landmarks. As a minimum it shall have the following: (1) project area boundary streets, (2) latitude and longitude of the project center, (3) county and State (or quarter, section) for (a) on-site construction and (b) off-site construction (i.e., demolition, new facility or utility trenches construction.)

1.9 RECEIVING WATERS

The SWPPP shall identify the body of water which receives runoff from the site(s), (a) on-site construction (b) off-site construction (i.e., demolition, utility trenches or new facility construction.)

PART 2 SITE DESCRIPTION

2.1 EXISTING CONDITIONS

The SWPPP describes the current site conditions, (a) on-site construction (b) off-site construction (i.e., demolition, new facility or utility trenches construction.) It includes information of site drainage patterns, runoff coefficients, and water quality. It discusses the design storm frequencies and duration for runoff volume calculations. If the site is located adjacent to an existing industrial facility or in a community greater than 100,000 people, records of storm water quality near the site

may be available.

2.2 FINAL CONDITIONS

The SWPPP describes the site conditions upon completion of construction activities, (a) on-site construction (b) off-site construction (i.e., demolition, new facility or utility trenches construction.) It provides future site runoff coefficients. It describes features that manage storm water volume and erosion concerns. The detailed information about pavement sections, handicap access, parking spaces, fence type, etc. is not necessary unless it impacts runoff.

2.3 CONSTRUCTION ACTIVITIES

The Contractor shall establish storm water BMP control structures prior to conducting site disturbing activities. The subsequent construction activities shall include clearing, grubbing, initial grading for sediment pond or trap, interim or temporary stabilization, site drainage grading, install additional BMP, 14th day stabilization of drainage swales, utility trenching and stabilize excavated material, foundation work, paving, and final site stabilization. The Contractor shall maintain temporary and permanent site stabilization at each portion of site.

It is a Federal and State requirement that the Contractor shall record the START date of major construction site activities (i.e. clearing and grubbing, grading, trenching and excavation, dirt moving, etc.), the STOP date when construction activities cease on a portion of the site, and the START date of stabilization measures (such as soil binders, seeding with native seed, erosion control compost, turf reinforcement mat, SCOUR STOP, etc.) The worksheet entitled "RECORD OF MAJOR CONSTRUCTION ACTIVITIES AND SUBSEQUENT STABILIZATION PRACTICES" is required in PART 12 ATTACHMENTS. Storm water control structures shall not be removed until establishment of permanent stabilization and approval of the Corps AOCO.

Definition of Final Stabilization at a construction site status where either of the following conditions are met:

(a) All soil disturbing activities on the construction sites have been completed, and all areas are covered with pavement, rip rap, gravel, landscaping vegetation, or have a surface of sediment cemented by nontoxic chemical binders with the integrity to withstand normal wind erosion. Equivalent measures can include the use of structural features such as gabions, geotextiles, mats, mulches and erosion control blankets. These permanent stabilization measures must be employed to the satisfaction of the Directorate of Environment on Fort Bliss. Natural revegetation of desert shrubs and grasses will be encouraged on non paved areas and on areas without regular tank and other vehicle traffic.

(b) For individual lots in a residential construction site by either:

(1) the homebuilder completing final stabilization as specified in condition (a) above; or

(2) the homebuilder establishing temporary stabilization for an individual lot prior to the time of transfer of the ownership of the home to the buyer and after informing the homeowner of the need for, and benefits of, final stabilization.

(c) For construction activities on land used for agricultural purposes (e.g. pipelines across crop or range land), final stabilization may be accomplished by returning the disturbed land to its preconstruction agricultural use. Areas disturbed that were not previously used for agricultural activities, such as buffer strips immediately adjacent to a surface water and areas which are not being returned to their preconstruction agricultural use must meet the final stabilization conditions of condition (a) above.

2.4 SOILS DATA

The SWPPP narrative shall provide soils information of proposed site. Possible sources of information are project soil report, USDA soil survey data, and other published sources. The SWPPP narrative shall describe quality of storm discharge from the proposed site.

2.5 STORM WATER POLLUTION PREVENTION DRAWINGS

The SWPPP drawing shall have sheet number and title.

The SWPPP drawings shall be prepared on site grading plans and the drawings shall depict the following.

(a) Existing site features and BMPs -- name of receiving waters (lake, stream, creek, river, unnamed tributary of named receiving stream, etc.), site storm water discharge locations, existing storm grates, outfall protection devices, and BMP.

(b) Interim grading site drainage features and BMPs -- slopes at rough grading, limit of soil disturbance area, outline of areas not to be disturbed (i.e. vegetative buffer zones, cultural resources, wetlands, and area of environmental concern), new storm grates, and new drainage ways leaving from the site, and BMP.

(c) Areas to receive temporary stabilization. Methods of stabilization at outfalls, channel protections, and slopes. Specification of vegetative ground cover (native seed mix and application rate and erosion control mat),

(d) Areas to receive final stabilization. Methods of stabilization. Specification of vegetative ground cover (native seed mix and application rate, soil binders, soil surface preparation) and erosion control mat), paving, and etc.

(e) On-site or off-site materials borrowed areas, clean dirt disposal areas, and BMP. Stabilized access roads, construction support or laydown (equipment, staging, parking, and storage areas) and BMP.

(f) Concrete or asphalt batch plant and BMP.

(g) BMP Construction Details (including concrete washout pit, fuel storage & fuel transfer area, and batch plant)

The SWPPP drawings shall have, as a minimum, the following:

PROJECT LOCATION AND VICINITY PLAN

(a) EROSION AND SEDIMENT CONTROL PLAN I (demolition site)

(b) EROSION AND SEDIMENT CONTROL PLAN II (existing site conditions depicting run-on flow diversion BMP and run-off BMP)

(c) EROSION AND SEDIMENT CONTROL PLAN II (interim site grading conditions depicting run-off BMP, swales BMP, storm grates BMP, and temporary stabilization areas & method specification)

(d) EROSION AND SEDIMENT CONTROL PLAN III (complete site grading conditions depicting run-off BMP, swales BMP, storm grates BMP, and final stabilization areas and method specification)

(e) EROSION AND SEDIMENT CONTROL CONSTRUCTION DETAILS

(f) NOTES on TIMING OF CONTROLS AND ACTIVITIES (see suggested list in PART 6, this section.) SWPPP designer, Fort Bliss Directorate of Environment, and USACE shall determine the applicable BMP controls for site conditions and operation of the specific project..

The SWPPP drawings shall be prepared by the Contractor once the limit of clearing is determined, and in consultation with site designer. The drawings shall be included in the construction SWPPP package for approval.

PART 3 EROSION AND SEDIMENT CONTROLS

3.1 CONTRACTOR(S) COMPLIANCE

All Contractors shall follow the Storm Water Pollution Prevention Plan (SWPPP) which is attached to and part of the construction documents as Appendix "A".

The Building and/or Product Line, or other Contractors, may elect to provide more stringent measures but any deviation must be approved by the Government.

The Building and/or Product Line Contractors are responsible for all Best Management Practices (BMP's) for erosion and sediment control within their construction limits.

Best Management Practices (BMP's) include, but are not limited to; soil binders, emulsions and tackifiers, watering, erosion control compost, geotextiles, channel liners, mulching, riprap or rock stabilization, gravel stabilization, soil retention, soil roughing, wind and sand fencing, contouring, silt fencing, sediment basins, storm drain inlet protection, Y inlet protection, rock filter dams, berms and socks, temporary stone construction entrances, erosion control blankets and mats, fiber rolls and erosion control logs, sediment traps, and straw bales or concrete blocks.

3.2 TEMPORARY STABILIZATION

Stabilization measures shall be initiated on the 14th day where construction activities are temporarily ceased and is not anticipated to resume on that portion of the site in the following seven (7) days.

The disturbed areas to receive paving, landscape treatment and turfing shall be covered by erosion control blankets. All other rough graded slopes, disturbed ground surfaces, and drainage channels shall receive seeding with native seed mix and then covered by erosion control blankets or straw mulching or other approved BMP.

The stockpile material shall be covered by soil erosion blanket or other temporary cover. A storm water perimeter control device shall be established at a minimum distance of 10 feet from the toe of stockpile. The materials excavated from utility trenching shall be protected from up gradient storm run-on.

The utility trench excavated material shall be covered by erosion control blanket spray with soil binders or other temporary cover.

The slopes shall be covered by erosion control blankets spray with soil binders or other temporary cover.

The Contractor shall provide all necessary labor, services, equipment, materials (i.e. fertilizer) to obtain, transport, apply, and maintain the temporary stabilized area until final stabilization is performed.

The Contractor's designer of the SWPPP shall have the landscape architect edit specifications for vegetative ground cover for soil preparation and erosion control. The SWPPP drawings shall depict areas to receive various methods of stabilization.

Other acceptable method for temporary stabilization includes water sprinkling with environmental sustainable soil binders (e.g. soilworks, dustless, DirtGlue, Soiltac, SoilLok, Terra Control, etc.) or straw mulching applied at 2 tons per acre and anchored by soil tackifier.

The construction SWPPP may specify other temporary stabilization method that is acceptable for the site conditions and in the industry.

3.3 PERMANENT STABILIZATION

The construction Contractor designated inspector shall inspect the site with the Corps AOCO and ensuring final stabilization is established. Final stabilization is defined as on the construction sites have been completed, and all areas are covered with pavement, rip rap, gravel, landscaping vegetation, or have a surface of sediment cemented by nontoxic chemical binders with the integrity to withstand normal wind erosion. Equivalent measures can include the use of structural features such as gabions, geotextiles, mats, mulches and erosion control blankets. These permanent stabilization measures must be employed to the satisfaction of the Directorate of Environment on Fort Bliss. Natural revegetation of desert shrubs and grasses will be encouraged on non paved areas and on areas without regular tank and other vehicle traffic. If final stabilization is unsatisfactory, additional work shall be required by the Corps AOCO. Other acceptable permanent stabilization methods include paving, rock blanket.

3.4 SEDIMENT BASIN

The TPDES Storm Water Discharge General Permit requires a temporary sediment basin for sites where 10 acres or more are disturbed at one time. If the disturbed site drains to a common location, a sediment pond or trap shall be constructed as initial grading activity. The pond shall be prepared by the site designer and it shall include layout and construction details. The pond storage shall have sufficient capacity to contain a calculated volume of runoff from a 2-yr, 24-hour storm from each acre drained until the disturbed site is permanently stabilized. When rainfall data is not available or a calculation cannot be performed, the sediment basin must provide at least 3,600 cubic feet of storage per acre drained until final stabilization of site. If the construction sediment pond will

be re-graded for finished site storm water detention, the designer shall need to use TR-55 NRC small watershed handbook or some other hydrograph routing based method. The rational method is only acceptable to size the construction sediment pond and it is not acceptable to size for finished site storm water management because it only provides peak flow rate. The runoff from the site does not drain to a common collection point; therefore, a temporary sediment basin is not required. A series of smaller sediment basins are constructed to provide for temporary sediment control is depicted on the grading plan. A series of smaller sediment basins are not attainable, effective sediment controls (i.e. vegetative strips and silt fences) are established on all the down slope of the disturbed site perimeter to control solids in runoff. A justification shall be provided if the construction sediment basin is not attainable. Temporary sediment pond receives final grade as a permanent sediment pond to manage storm runoff at the finished site. A temporary sediment basin is not required because construction activities at each portion of the disturbed site is less than 10 acres. The following elements are required if a sediment pond is constructed as an initial site activity: The slopes of retention pond shall be seeded and covered by soil erosion control blankets. The storm water shall allow to settle for at least three (3) days after each rainfall event before dewatering with a pond skimmer. The pond skimmer is always placed at a dry area on the bank, except when it is placed and turned open at the low point of the retention pond after silting has occurred. When the pond is drained, the skimmer shall be removed until the next storm event and silting has occurred. The pond skimmer shall be a faircloth skimmer or equal (www.fairclothskimmer.com). It shall be installed per manufacturer's recommendations. The outlet structure detail down gradient from pond skimmer shall be designed and submitted for approval to prevent erosion.

3.5 BEST MANAGEMENT PRACTICES (BMP) - STRUCTURAL CONTROLS

3.5.1 Silt Fence

Silt fence shall used for ponding runoff and sediments from sheet flow. The site gradeient shall not exceed 2:1 (horizontal to vertical) ratio. Each run of silt fence shall only collect drainage from a disturbed area of less than 0.25 acre. The maximum length of slope above each silt fence shall not exceed 100 linear feet. Each run of silt fence shall not extent longer than 200 feet. Runs of silt fence shall overlap on ends. Silt fence shall not be placed across slopes and flow channels (i.e. swales and ditches). The Contractor designated inspector shall remove sediments from silt fence and ensure they are intact and holding storm water and sediments from storm runoff. Sediment and water shall be removed where its at 1/3 height of barrier

3.5.2 Straw Bale Dike

Straw Bale Dike shall not placed across flow channels (i.e. swales and ditches) and slopes. Straw Bale Dike shall only be used where the effectiveness is required for less than 3 months. The Contractor designated inspector shall remove sediments and water upslope of barrier and ensure they are intact and holding sediments and storm water. Sediments and water shall be removed where its at 1/3 height of barrier.

3.5.3 Stabilized Construction Access

The Contractor shall establish, inspect, and maintain the stabilized construction access at the juncture between the unpaved new access road and

the existing paved roadway. The stabilized construction access shall be away from waterways. The minimum width and depth of entrance is 15 feet and 20 feet, respectively, for one acre and slightly larger site. For sites five (5) acres and larger, the minimum width and depth of entrance is 30 feet and 80 feet, respectively. The construction stabilized access shall have a wheel wash device and sediment trap unless it drains into a construction sediment pond. The Contractor shall use temporary asphalt pavement for major site access roadway if the site is 10 acres and larger, and/or the disturbed site will not be stabilized in three (3) months.

3.5.4 Contractor Staging, Parking, Material Storage, Borrow and Disposal Areas Protection Device

The Contractor shall establish BMP control structures around the staging, parking, material stockpiled areas, borrow and disposal areas, and concrete or asphalt batch plant (if required.) A stabilized area with BMP control structures is required for laydown. If dusty conditions would pose adverse affect to existing facilities in operation, the Contractor shall use temporary asphalt pavement for laydown. The Contractor shall inspect and maintain BMP at these locations.

3.5.5 Rock Berm, Check Dam, Erosion Control Compost Berm

Rock berm, check dam, erosion control compost berm are recommended as velocity dissipation device across swales and ditches. Rock berm or check dam shall use open graded rock of 4 to 6 inches diameter. The graded rock shall secure with woven sheath of 1-inch diameter opening (maximum) and wire diameter of 20 gauge (minimum). Sediments at 1/3 height of barrier shall be removed.

3.5.6 New and Existing Inlet Protection Device

Sediment traps constructed from gravel bag berms, concrete blocks, sediment logs, silt fence, and erosion control compost logs (compost in socks or tubes) shall be installed upstream of existing and new storm inlets and catch basin. Specific BMP construction detail shall include with the construction operation SWPPP drawings.

3.5.7 Rock Berm, Check Dam, Erosion Control Compost or Organic Filter Berm

Rock berm, check dam, erosion control compost berm are recommended as velocity dissipation device across swales and ditches. Rock berm and check dam shall have open graded rock of 4 to 6 inches diameter. The graded rock shall secure with woven sheath of 1-inch diameter opening (maximum) and wire diameter of 20 gauge (minimum). Erosion control compost or organic filter berm (compost blown into socks and tubes) reduces flow rate and improves storm water quality. BMP that improved storm water quality shall be used across rough graded swales and ditches.

3.5.8 Outfall Impact Protection Device

Outfall impact protection devices shall be placed at existing and new drainage outfalls, and pipe culverts to minimize soil scouring by absorbing flow energy to produce non-erosive velocity. Such as installing SCOUR MAT at impact location, and cover with TURF REINFORCEMENT MAT (TRM) or other approved methods to protect post construction channel erosion.

3.5.9 Pipe Slope Drain

Pipe Slope Drain is acceptable for drainage area not to exceed 10 acres. The Contractor shall inspect outlet pipe for erosion and check the pipe for breakage.

3.4.10 Excavated Sediment Trap

Excavated Sediment Trap is acceptable for drainage area of less than 1 acre and with slope of 5 percent or less, where overflow capacity is needed, and in area of heavy flow of 0.5 CFS or greater. The recommended volume of the sediment trap is 35 cubic yard per acre disturbed. The Contractor shall remove and dispose of sediment when it accumulates to 1/2 of the filter stone height.

3.5.10 Diversion or Earth Dike

Diversion Dike shall be placed parallel to existing contours for perimeter control by diverting run-on water away from disturbed area. The dike height shall be at least 1 foot greater than the flow depth for the 10-year storm event. Dike side slopes shall be less than 3 to 1 (0.33 percent grade).

3.5.11 Interceptor Swale

Interceptor Swale shall be placed to divert runoff from disturbed upland area. The flow shall be conveyed to a sediment trapping device. Swale stabilization is required.

3.5.12 Soil Stabilization

Soil stabilization is required on exposed soil on the 14th day when no earth work is anticipated in the following 7 days. Soil binders shall be sprayed on disturbed areas adjacent to new curbs, gutters, surface grates, perimeter of disturbed construction site, and adjacent area of concrete or asphalt pavement. The disturbed slopes along stream banks shall require temporary stabilization by fiber rolls and erosion control blanket. Reference CALTRANS Storm Water Quality Handbooks for construction detail.

3.5.13 Erosion Control Compost (ECC) Logs (Compost blown into socks or tubes) or Sediment Logs

The ECC logs (or sediment log) per TXDOT spec items 161 and 5049 is biodegradable and is free of weed and seed. The ECC could be used to prepare disturbed surfaces to receive seeding with native seed mix. The ECC logs are porous and reusable. It holds its shape and retain sediments from storm water that passes through the log diameter. It is typically placed across swales and storm grates to improve runoff water quality. It is also used as a perimeter control at least 10 feet from the stockpiled material. it could be used to construct sediment trap upstream of catch basins. The standard size log is 12 inches in diameter or less. For concentrated flow area, logs of 20-inch diameter minimum shall be used.

PART 4 STORM WATER MANAGEMENT AND CONTROLS

4.1 RUNOFF COMPUTATIONS

The SWPPP shall provide design storm frequencies and durations, and erosion and sediment control at (a) on-site construction (b) off-site construction

(i.e., demolition, utility trenches, or new facility construction.)

4.2 SURFACE DISCHARGE QUALITY

The construction SWPPP shall determine if there are concerns with storm water discharge or discharges from other sources. The Contractor's SWPPP designer shall consult the construction contractor to determine concrete washout pit capacity at the job site to provide total containment including storm event. The wastewater from concrete washing activity is prohibited from discharging as surface runoff. The construction Contractor is responsible to recycle concrete and dispose the wastewater at permitted treatment facility.

4.3 PERMANENT EROSION CONTROL STRUCTURES AND STORM WATER TREATMENT UNIT

Permanent drainage structures, including concrete curbs and gutters, storm drainage system, concrete pavement, asphalt pavement, drainage swale, drainage ditch, concrete culvert, pipe culvert, will provide erosion control at the project site.

Storm water treatment unit shall have a stainless steel expanded screen opening of at least 4700 microns (4.7 mm or 0.185 inches) to remove sediment.

4.4 OUTLET PROTECTION OR OUTFALL VELOCITY DISSIPATION DEVICES

The outlet protection or outfall dissipation device shall provide non-erosive flow conditions at the point of surface water discharge to the ditch or swale and downstream of the outfall or channel in accordance with the task order scope of services.

PART 5 BEST MANAGEMENT PRACTICES (BMP) - NON STRUCTURAL CONTROLS

The Contractor (and other contractors) shall be responsible for eliminating pollutants in storm runoff from the project site. The Contractor (and other contractors) shall be responsible for installing and maintaining BMP to minimize storm water pollution. The Contractor operation specific SWPPP shall, as a minimum, identify BMP in the Contractor SWP3 on:

- Construction Practices (i.e. Dewatering Operations, Paving Operations, Structure Construction and Painting),
- Concrete washout area, control of sediment & acidity,
- Material Management (List of on-site construction material, Material Delivery and Storage, Material Use, Spill Prevention and Control, MSDS)
- Vehicle and Equipment Management - Vehicle and Equipment Cleaning,
- Vehicle and Equipment Fueling Area, Vehicle and Equipment Maintenance,
- Dust Control for Various Site Conditions (i.e. Non-Traffic Disturbed Areas, Disturbed Areas Subject to Traffic, Material Stock Pile Stabilization, Clearing/Excavation, Demolition, Truck Traffic on Unpaved Road, Mud/Dirt Carry-Out),
- Prohibition of non-storm water discharge (PART 10),
- Dechlorination of the superchlorinated water generated from water line disinfection per AWWA C651, identify method of dechlorination,
- Method to reduce turbidity from surface runoff in excavated areas,
- Employee Training for Contractor and Subcontractor.

The Contractor operation specific SWPPP shall non-structural BMP Fact Sheets.

5.1 CONSTRUCTION PRACTICES

Dewatering Operations: The Contractor (and other contractors) shall prevent discharge of sediment by methods of sediment control, containment, and disposal. In project areas suspected of potential toxic or petroleum products contamination, the water shall be tested to determine method of disposal.

Paving Operations: The Contractor (and other contractors) shall avoid discharge of pollutants to storm drains by avoiding asphalt and concrete paving in wet weather or anticipation of such event, storing material in covered containers, covering and berming storage areas, establish control structures, cover on-site storm grates, and worker and subcontractor training.

Structure Construction and Painting: The Contractor (and other contractors) shall prevent pollutants in storm runoff by covering, or berming material storage areas, keeping job site clean and orderly, using safer alternate products, stabilizing adjacent disturbed areas, storing material in secondary containment, protecting on-site storm drain, establish control structures, and training of workers and subcontractor.

Solid Waste Materials: Trash and uncontaminated construction debris shall be placed in appropriate covered waste containers. Waste containers shall be emptied regularly; they shall not be allowed to overflow. The disposal area of excavated material from project construction shall not be utilized for waste disposal. Routine janitorial service shall be provided for all construction buildings and surrounding grounds. No construction waste materials, including concrete, shall be buried or otherwise disposed of on-site. The Contractor shall brief all on site personnel on good house-keeping and waste minimization.

5.2 MATERIAL MANAGEMENT

Material Delivery and Storage Practice: The Contractor (and other contractors) shall prevent or reduce discharge of pollutants to storm water by minimizing and on-site storage of hazardous and toxic (HT) materials, storing HT in clearly labeled, corrosion-resistant containers with secondary containment at designated areas approved by the COR, conducting frequent inspection, keeping current inventory of construction materials on site, training of workers and subcontractor. The storage of reactive, ignitable or flammable liquids shall comply with applicable fire codes of the project area. The Contractor shall contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements.

Material Use and Inventory: The common on-site materials are: pesticides and herbicides, fertilizers, detergents, concrete material, petroleum-based products, fertilizers, tar, asphalt, steel reinforcing bars, other hazardous chemicals such as acid, lime, solvents, curing compounds, sealants, paints, glues, fertilizers, steel reinforcing bars, etc. The Contractor (and other contractors) shall use less hazardous, alternate or environmental friendly material. The Contractor shall have (1) a list of construction materials used on site, (2) a list of materials and associated potential pollutants, and (3) method of storage and containment in the Contractor operation specific SWPPP. The Material Safety Data Sheet for each construction materials and products shall be in the Contractor's field and operation activity specific SWPPP or as a separate MSDS folder on site.

It will be available on request by regulator agency visitors, safety officers, or COR.

Dust Control: Soil binders shall be used for dust control (see PART 3, this Section).

Spill Prevention and Control: The Contractor (and other contractors) shall store HT material in covered containers and inside a fenced area, have temporary fuel storage tank bermed or contained to meet applicable Fire Code, place readily accessible spill clean-up materials, have protocol for stop work immediately, notification, clean-up, labeling, storage and packaging, transportation, disposal, record-keeping, closure activities, and provide training to workers and subcontractor for response to spills.

5.3 WASTE MANAGEMENT

Solid Waste: Solid waste materials (i.e. excess fresh concrete, grout, mortar or uncontaminated debris) shall be placed in covered containers, and recycled. Vegetation from site clearing shall be shredded and used as mulching material after site stabilization. Packaging materials such as wood, plastic, and paper shall be recycled to the maximum extent possible and not disposed of in a landfill. It is a requirement to perform recycling (see SECTION 01 74 19). The Contractor shall designate waste containers for segregating waste (municipal, metal, aluminum, plastic, wood pallet, packaging, glass, etc.) Dry paint cans shall be recycled. The Contractor shall designate waste disposal area, have a routine janitorial service for all structures and surrounding grounds, and have a routine schedule to service waste containers. The disposal area of excavated material from project construction shall not be utilized for solid or refuse waste disposal. Personnel on the job site shall be briefed on minimizing disposal to landfill by waste segregation and recycling.

Hazardous and Toxic Waste: All excess on-site material such as paints, solvents, petroleum products (fuel, oil, and grease), herbicides, pesticides, acids for cleaning masonry, concrete curing compounds, sealants, paint strippers, wastes from oil-based paint, and glues could become HT waste. Containers of excess material shall be labeled and managed according to the labels and as recommended by the product manufacturers. If there are no instruction provided, the Contractor shall turn in contained waste to the installation DRMO, the local household hazardous waste drop-off, or recycling program.

Contaminated Soil: If suspicious of soil contamination during soil moving activities, the Contractor (and other contractors) shall stop work, notify COR, and establish containment to prevent soil transport or runoff from that location. For removal of contaminated soil, a WORK PLAN shall be prepared for COR approval prior to handling and management of the material. The WORK PLAN shall at least include the following: containment, sampling & analyses, notification to regulatory agencies, transportation, worker safety, training & environmental monitoring, disposal, and documentation and record-keeping.

Construction and Concrete Waste: Construction waste or surplus materials, demolition building debris, scrap metal, rubber, plastic, glass, concrete, and masonry products shall be segregated and recycled to minimize landfill disposal. No construction waste shall be buried or disposed of on-site. Concrete waste shall be controlled and minimized by appropriate storage methods for dry and wet materials, and control the amount of concrete and cement mixed on site. Sweepings from exposed aggregate concrete shall be

collected and returned to aggregate stockpile and they shall not be washed into streets or storm drains. Concrete wastewater from wash pit is not permitted to discharge as storm runoff. It shall be removed by the Contractor and disposed at a permitted facility. Concrete wash pit shall be at a pre-approved location, (1) at least 50 feet from storm drains, open ditches, or water bodies, and (2) surrounded by a containment berm with a temporary pit or sediment trap with impermeable liner for containment and settling of washout. Settled solids and set concrete from the pit or trap shall be removed and recycled by the Contractor. The Contractor is responsible for all fees, levies, and disposal cost and shall provide a treatment facility signed delivery ticket.

Sanitary/Septic Waste: On-site sanitary facilities shall be established at a convenient location. Facility location, design, maintenance, and waste collection practices shall be approved by COR and are in accordance with local regulations. The Contractor (and other contractors) shall have a routine schedule for waste pump out by a licensed hauler. Septic waste treatment system shall have a pre-construction permit from the local health regulating agency and have contract service with a licensed company. Temporary sanitary facilities discharging to sanitary sewer system shall be approved by the operator of the system and properly connected to avoid illicit discharges. Wastewater from water-based paint shall not be discharged as sanitary waste.

Building Exterior Cleaning or High-pressure Wash: Storm drains shall be protected by approved storm water control device. Wash onto dirt area, spade in, settle solids in pit, collect (mop up) and discharge to sanitary sewer (with approval from sewer operator). If the exterior paint contains lead exceeding the levels stated in the Consumer Safety Standard, mercury or mildewcide, the wash water shall be collected and disposed of as regulated material that will require sampling data for disposal to permitted facility.

Street/Pavement Cleaning: Water used for this activity shall be minimized and sediment basin shall be used to contain wastewater. At completion of construction, the silt shall be removed and disposed of in accordance with applicable regulations, and water from the basin shall be pumped to a sanitary sewer with written approval from the COR.

Care of Storm Water from Excavated Areas: Storm water trapped in excavated areas shall be lifted or pumped into a temporary bermed sediment basin (or area that bermed with filter socks with compost material or other organic material) for sediments removal. The filtered water shall runoff as sheet flow from the bermed area. The temporary sediment basin shall have the maximum separation distance possible from the site drainage outfall.

5.4 VEHICLE AND EQUIPMENT MANAGEMENT

Off-site Vehicle Tracking and Dust Control: The Contractor is required to keep vehicles from tracking soils from the project, borrow, and disposal sites. Temporary parking area(s) to be used 30 calendar days or more for the Contractor's equipment or personal vehicles shall be paved with temporary asphalt. The temporary parking areas shall be removed by the Contractor upon project completion and restored to the satisfaction of the COR. Water sprinkling, and in addition, application of approved soil binders shall be used for dust control, if site condition is arid and windy, if airborne dust has an impact upon adjacent areas, and as requested by Area Office Contracting Officer during the contractual period. Materials to be transported by truck or other equipment that promote fugitive particle

emissions shall be covered and/or sprayed. It is necessary to control runoff when sprinkling is used.

Vehicle and Equipment Cleaning: Washing shall be performed off site at a commercial washing facility that has an oil/water separator as pre-treatment before connection to municipal sewer system. No vehicle washing is allowed on site, unless is washing the concrete truck and wastewater is trapped in a washout pit with secondary containment. The on-site washout shall a liquid-tight berm and impervious liner. If wastewater is drained into a lined sediment basin constructed by the Contractor, it shall be pre-approved. After project completion, the Contractor shall contain wastewater, clean the basin, test and dispose of wastewater and sediment, in accordance with applicable regulations and to the satisfaction of the Corps Area Office Contracting Officer. Steam cleaning is prohibited on site because it generates significant pollutant concentrations.

Vehicle and Equipment Fueling: Fueling shall be off-site. If fueling must occur on-site, a written approval shall be obtained. If fueling is pre-approved, it shall be at least 150 feet from drainage courses. The Contractor shall provide a construction detail to depict best management practice for fuel storage and fuel transfer /dispensing area. Fueling operations shall avoid topping of fuel tank, and avoid mobile fueling of mobile construction equipment. Fueling locations shall use impervious secondary containment (i.e. a liquid-tight berm and an impermeable liner) The containment capacity shall be 110 percent (%) of the stored fluid.

It is necessary to have a clean-up kit and containment boom (or absorbant material) available at all times for immediate clean-up during fueling. No petroleum fuel, oil or lubricants or products tanks are allowed on-site unless is pre-approved in writing. Emergency cut-off valve and or overflow protection device is required on fuel transfer equipment. The temporary fuel containers placed on-site shall meet the industrial standard, labeled and stored in accordance with applicable Federal, state, and local Fire codes

In case of spill, avoid hosing down or burial of spilled fuel. When spill occurs, perform immediate clean-up, notify Corps Area Office contracting Officer (AOCO) immediately, and AOCO shall contact installation Environmental Office. If spillage exceed reportable limits, the Contractor is required to notify regulatory agency, submit spill reports, clean-up per regulations. NOTE: reference spills response RG-285 and on web address <http://www.tceq.state.tx.us/response/spills.html> in the State of Texas, or regulations of responsible state agency, or 40 CFR PART 302 DESIGNATION, REPORTABLE QUANTITIES, AND NOTIFICATION.)

Vehicle and Equipment Maintenance: Outdoor vehicle or equipment maintenance is a significant potential source of storm water pollution. Activities include engine repair, changing fluids, etc. Such activities shall be prohibited at the job site. The general construction Contractor shall verify proofs on routine maintenance of construction equipment and vehicles before bringing them to job site.

Vehicle and Equipment Parking: All vehicle or equipment parked on-site shall have drip pan or drop cloth to catch spill or leak. Vehicle or equipment shall be regularly inspected for leaks and schedule routine maintenance to reduce the potential for leaks. If leaks are observed at job site, such vehicle or equipment shall be removed from site.

5.5 EMPLOYEE AND SUBCONTRACTOR TRAINING

The Contractor is responsible for providing training for all workers (including the subcontractor) on the job site. The objectives in training are to provide a clear concept of activities or problems that generate pollutants to storm water, identify solutions (BMPs), promote ownership of the problems and solutions, and integrate feedback into training and BMP implementation. A certificate to verify completion of training shall be signed by all trained personnel.

5.6 STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

The Corps approved SWPPP shall be readily available to inspector either from the Corps or regulatory agency. The Construction Site Notice shall indicate location of the Corps approved SWPPP. The construction and operation specific SWPPP shall be completed before filing for NOI. The structural and non-structural BMP shall be implemented prior to commencement of site clearing and grubbing. The Corps approved BMP and SWPPP shall be revised at no cost by the construction Contractor when there are changes in site conditions, sequence of construction and operation, or when sediments escape from the job site. The BMP and SWPPP shall be updated by the construction Contractor upon request of the Corps AOCO.

The CONSTRUCTION SITE NOTICE, SWPPP REVISION RECORD, SWPPP INSPECTION AND MAINTENANCE REPORT FORM, NOI & NOT from each operator, RECORD OF MAJOR CONSTRUCTION ACTIVITIES AND SUBSEQUENT STABILIZATION, NON-STORM WATER DISCHARGE ASSESSMENT AND CERTIFICATION, and others worksheets as listed in PART 12 ATTACHMENT, shall be included with the construction operation SWPPP.

5.7 SPILL CONTROL, RESPONSE AND REPORTING

In case of spill of hazardous, toxic, and radiological waste (HTRW), the Contractor shall stop work, contain spill, notify the AOCO and Safety Office, and execute spill control per the SPILL CONTROL PLAN as required in specification Section 01 57 20.00 10 ENVIRONMENTAL PROTECTION in the Master MATOC Contract. Spill control, response, notification, clean-up, restoration, reporting, record-keeping, etc. shall be in accordance with 40 CFR 110 and 40 CFR 112, other applicable Federal, state, and local regulations, and to the satisfaction of the AOCO. NOTE: For the State of Texas, the SWPPP shall reference Spill Response web page at <http://www.tceq.state.tx.us/response/spills.html> and RG 285.

PART 6 TIMING OF CONTROLS AND ACTIVITIES

The general Contractor shall discuss timing (sequence) of controls and construction activities to minimize soil loss from exposed areas in the construction operation SWPPP. NOTES of Timing of Controls and Activities specific for each contract shall be depicted on SWPPP drawings.

The following is a list of generic Timing of Controls and Activities.

- Minimize area of disturbance
- Preserve existing vegetation at lower part of site, do not disturb ground cover until it is necessary to proceed with field work
- Install stabilized construction access
- Install BMP at contractor staging, stockpiles, storage, parking,

borrow areas, and stockpiles (on-site and off-site locations), concrete washout pit, fuel storage/transfer area

- Install BMP at existing storm grates (i.e. curb inlets surface inlets, manholes, catch basins, etc.
 - Install flow diversion dike and stabilize dike. Construct sediment trap at the end of dike
 - Track weather and protect exposed areas with erosion control blanket before storms.
 - Construct outfall, install BMP at initial impact location, and stabilize flow channel (sod or native seed mix species & application rate) prior to clearing upper watershed
 - Stage construction, to the maximum extent possible, disturb, protect, and stabilize one side of river bank, and disturb the opposite side
 - Install BMP to protect site run-off after evaluating for adequate velocity dissipation and channel protection (example: SCOUR STOP or rock rip rap)
- (reference HEC No. 15 - Design of Roadside Channels with Flexible Linings, HEC No. 22 - Urban Drainage Design Manual, HEC No. 14 - Hydraulic Design of Energy Dissipators for Culverts and Channels, http://www.fhwa.dot.gov/engineering/hydraulics/library_listing.cfminital)
- Stabilize flow channel (i.e soil binders, and overlayment with composite fiber turf reinforcement mat (TRM)
 - Clear site for sediment pond after installing outfall and stabilize flow channels.
 - Stabilize pond slopes (i.e. soil binders, and overlayment with turf reinforcement mat (TRM)
 - Start grading up gradient of site, complete rough grading. Stabilize disturbed areas (i.e. soil binders native seed mix and overlay with TRM). Apply erosion control blanket on exposed areas that require paving or landscape treatment
 - Avoid disturbing down slope of site until up gradient disturbed areas are stabilized
 - Stabilize all exposed areas by the 14 days, if no work is scheduled in the following 7 days
 - Delay construction of infiltration measures until the end of project when drainage areas are stabilized
 - Install BMP protections at new storm grates (i.e. curb inlets surface inlets, manholes, catch basins, etc.
 - Protect excavated materials from utility trenching (erosion control blankets). Install BMP perimeter controls to protect materials from run-on and run-off.

- Stabilize stockpiles (environmental soil binders). Install BMP at

least 10 feet minimum from the toe of material.

- Backfill utility trenches in a timely manner to minimize erosion & soil loss
- Monitor weather reports to schedule paving (asphalt or concrete), concrete saw cutting, foundation work, dust control, seeding or any activities that will impact run-off
- Inspect and maintain BMP control structures. Maintain good housekeeping.
- Evaluate BMP and revise BMP when site conditions or activities changed. Assess and certify non-storm water discharges. Maintain permit required field records and training logs.
- Monitor discharge from concrete batch plant. Submit a copy of Discharge Monitoring Report to the regulatory agency.
- Maintain stabilized areas until final project acceptance (i.e. watering, soil binders, etc.)
- Verify final stabilization of disturbed areas with area office contracting officer (AOCO) representative. See definition in PART 2.3.
- Remove sediment and BMP control structures once disturbed areas are permanently stabilized and accepted by AOCO. Obtain photographs of site to prove establishment of stabilization and removal of all BMP controls.
- File for NOT by construction contractor. Provide a copy of NOT through AOCO to PER-EE.

PART 7 COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

Army Regulation 200-1 requires that all Department of Defense installations and Contractors to comply with Federal environmental protection statutes, which includes a provision to observe State, and local environmental regulations.

The SWPPP shall identify document prepared for compliance with the National Environmental Policy Act (NEPA) of 1969, as amended, and discuss mitigation or protection methods to minimize impact. The NEPA discusses the impact of proposed construction activities on the endangered and threatened species and their critical habitats, archeological, cultural and historical resources and properties, wetlands, floodplains, environmental contamination and compliance issue, water resources, ecological resource, land use, noise, air quality, etc.

The base Environmental Office is responsible to prepare the NEPA document at initial project design phase when the new facility site and existing structures to be demolished are determined.

The Contractor SWPPP shall include the title of the NEPA compliance document (i.e. Record of Environmental Consideration, Environmental Impact Statement, Environmental Assessment), date of document approval, and impact findings.

In compliance with the Federal and state regulations, a construction site of one (1) acre in size, or larger will require a SWPPP. If the total

project disturbed area is five (5) acres and larger, in addition to SWPPP, submittal of a Notice of Intent and Notice of Termination for a permit discharging Storm Water is required.

Section 404 of the Clean Water Act (CWA) stipulates discharge of dredge and fill material with jurisdictional Waters of the United States. At early project design phase, the civil and environmental disciplines shall determine if the limit of construction has impacted the Clean Water Act, Section 404. It is necessary to evaluate if the impacted drainage waterways or watersheds (dry creeks and streams) within the limit of construction are contributing to the Waters of United States. The review process may require wetland delineation to identify existing national permit coverage or issuance of a permit for compliance with Clean Water Act Section 404. The 404 permit or a permit coverage verification memorandum could require compensatory mitigation. The required compensatory mitigation shall be included in the project site layout and landscaping design. The permit stipulated mitigation protocol shall become part of the contract. The construction Contractor shall not start soil disturbing activities until the required compensatory mitigation design is in-place and approved for construction. At completion of construction for mitigation, a CERTIFICATION OF 404 PERMIT COMPLIANCE shall be signed and dated by the permit holder, the base Environmental Office.

The civil discipline and environmental planner shall evaluate the proposed site compliance with Clean Water Act, Section 10, the Rivers & Harbor Act of 1899.

Section 401 of the Clean Water Act stipulates the on-site sewerage discharge. If an on-site sewerage system is required, the Contractor shall prepare drawings and specifications, obtain a pre-construction permit from the state, regional Environmental Office, or County Health Department.

The Contractor shall resolve all permit compliance issues prior to disturbing soil.

PART 8 MAINTENANCE AND INSPECTION PROCEDURES AND QUALIFICATION OF DESIGNATED INSPECTOR

The Contractor shall designate an inspector on site to ensure Storm Water Permit compliance and perform SWPPP quality control. All BMP and control structures shall be inspected at least once every fourteen (14) calendar days and within twenty-four (24) hours, and after storm event of 0.5 inch or greater. The inspector or storm water quality control individual shall inspect erosion and soil loss at outfalls, down gradient of construction areas.

The inspector or storm water quality control individual shall inspect adjacent areas daily, direct clean-up waste materials, debris, and fugitive sediment that are blown or washed off site

Temporary erosion control measures shall be inspected for bare spots and washouts. Discharge points shall be inspected for signs of erosion or sediment. Locations where vehicles enter and leave the site, erosion control structure at contractor staging, material borrow, disposal, and stockpiled areas shall be checked for signs of off-site sediment tracking. Sediments shall be removed from control structures at one-third of barrier height or 30 percent of the design capacity of sediment trap or sediment pond. Erosion and sediment controls that have been intentional disabled, run-over, removed, or rendered ineffective shall be replaced or corrected

immediately upon discovery.

The Designated Storm Water Inspector shall have a basic knowledge of the engineering principles in eliminating pollutants in storm water. The inspector shall have past experience and thoroughly understand the requirements of the Storm Water Discharge Construction Permit, BMP, Government requirements as stated herein, and shall implement the approved Contractor's SWPPP.

The designated person shall have current certification of industry recognized training on storm water quality, construction discharges, and best management practices (BMP), sponsored by EPA, International Erosion Control Association (ieca), state agency, or BMP vendors (NOTES for TEXAS: Texas Environmental Extension Services), etc.

The Contractor shall provide briefing and training on SWPPP & BMP to all on-site workers prior to start of soil disturbing activities.

The designated SWPPP inspector is responsible for SWPPP REVISION, document corrections, and record-keeping. The Contractor shall continually review the BMP effectiveness and revise SWPPP. All deficiencies shall be corrected and recorded in SWPPP INSPECTION AND MAINTENANCE REPORT. A current copy of SWPPP REVISION and SWPPP INSPECTION AND MAINTENANCE REPORT shall be provided to the Corps area office Contracting Officer (AOCO). Corrections to these problems shall be implemented within seven (7) calendar days. After initial stabilization, the Contractor shall inspect the site once a month until project acceptance by the Corps AOCO. The unsatisfactory stabilized areas shall be further stabilized at request of the Corps AOCO.

PART 9 LIST OF ON-SITE MATERIALS, POTENTIAL POLLUTANTS AND SOURCES

The construction SWPPP shall identify construction materials (i.e, paint, sealants, fuel, etc.) to be brought onto the job site. In addition, the Contractor shall discuss the potential pollutants from the on-site construction materials, the other on-site sources of pollution and the BMP to reduce pollutants in storm runoff.

The Contractor shall identify if there is a pollutant source discharges from Concrete (or Asphalt) Batch Plant. The Contractor shall discuss the BMP method of pollutant control and the applicable storm control structural devices shall be shown on the SWPPP drawings. The Inspection Report Form shall include batch plant discharge monitoring data. Such record shall be kept by the Contractor per Storm Water General Permit for construction.

The Contractor shall have a Material Safety Data Sheet for each construction material or substance brought on-site. It shall be available to the COR on request.

The Contractor shall provide description of each waste material stored on site, the potential pollutants, and method of storage to avoid storm water contamination.

PART 10 PROHIBITION ON NON-STORM WATER DISCHARGES

In accordance with the Federal Register, Volume 63, No.128, July 6, 1998 Notices, non-storm water discharge is prohibited during construction of the project, except for a list of non-storm water discharges. The following list of non-storm water discharges from active construction site is allowed

and is developed based on the above guideline.

- (a) fire fighting activities
- (b) fire hydrants flushing
- (c) dust control runoff to minimize off-site tracking of vehicles
- (d) potable water sources including waterline flushing of existing water lines (excluding new water line pressure testing or disinfection wastewater)
- (e) routine external building wash down which does not use detergents and the exterior paint that does not contain mercury, lead, cadmium, and mildewcides
- (f) air conditioning condensate
- (g) uncontaminated spring or ground water
- (h) foundation and footing drains which do not contain contaminated process materials such as solvents

The Contractor designated Storm Water Inspector shall perform routine inspection and record findings in the NON-STORM WATER DISCHARGE ASSESSMENT AND CERTIFICATION.

PART 11 CONTRACTOR COMPLIANCE AND CERTIFICATION

The construction contractor shall use this basic SWPPP template to prepare a construction SWPPP that includes narrative, drawings, and PART 12 ATTACHMENTS (permit required worksheets). Prior to submitting NOI to the regulatory agency, the Contractor shall submit the operation and field specific SWPPP for review and approval.

The SWPPP CERTIFICATION assures responsibility and compliance with the permitted discharges of storm water during construction.

The construction operation SWPPP shall be certified. The USACE sharing the approved SWPPP shall prepare a SWPPP CERTIFICATION. The construction contractor and sub-contractor shall each prepare a SWPPP CERTIFICATION. The SWPPP CERTIFICATION shall include printed name, title of executing officer, signature and date. All SWPPP certifications shall be included in the shared SWPPP.

11.1 CONSTRUCTION SWPPP GUIDELINES

An adequate construction SWPPP includes a narrative, drawings (see PART 2.5 in this SECTION), and worksheets or attachments (PART 12 in this SECTION).

The narrative is a written statement to explain and justify the pollution prevention decisions made for a particular project. The narrative shall contain concise information about existing site conditions, construction phasing, BMP practices, construction schedule, and the performance the BMPs are expected to achieve, and actions to be taken if the performance goals are not achieved, and other pertinent items that may not be contained on the drawings.

The narrative shall identify all co-operators (reference PART 1.3).

The site grading plans shall be used to prepare SWPPP drawings. They shall depict NOTES on TIMING CONTROLS AND ACTIVITIES. The drawings shall layout various BMP types, locations, and methods of stabilization.

Reference www.epa.gov/npdes/swpppguide or <http://cfpub.epa.gov/npdes/stormwater/swppp.cfm> for guidance and template

for a SWPPP template.

It is necessary to meet storm water permit and requirements stated in this SECTION.

The SWPPP shall also address the following.

- Critical Areas

Describe the location, size, and characteristics of any wetlands, streams, or lakes that are adjacent or in close proximity to the site, and/or will receive discharges from disturbed areas of the project. Also delineate areas with high erosion potential including steep slopes.

List Threatened and Endangered Species and Critical Habitats.

List Cultural and Historical Resources.

- Clean Water Act Section 404 Memo or Permit Stipulations

- Septic System Permit

- Water well Permit

- Description of Potential Pollutants On-Site

Describe potential pollutants. List construction and waste materials, chemicals, paints, solvents, concrete wash pit, fuel storage tank and fuel locations, etc. storage location on-site and containment method.

- Provide permit required WORKSHEETS for records (See PART 12, this SECTION)

- Material Safety Data Sheet of all construction materials and products at job site shall be listed. If separate folder is used for MSDS, identify location of MSDS in the SWPPP.

- Identify if concrete/asphalt plant is at site
(A batch plant shall require coverage of an industrial operation permit)

- Include a separate WORKSHEET entitled DISCHARGE MONITORING REPORT, as an attachment to SWPPP (and identify who is responsible to perform water sampling and monitoring batch plant discharge)

- Spill Prevention and Control Measures per state or EPA and local requirements

- Spill Response

- Permanent (Post-Construction) Storm Water Management Controls

Provide a description of measures that will be installed to control pollutants (sediment, oil, grease, fertilizer, pesticides, etc.) in storm water discharges that will occur after construction is complete and the developed property is placed in service.

- SWPPP for LARGE CONSTRUCTION SITE is incomplete without a copy of Secondary Operator Notice by the Corps and Corps SWPPP Certification, and Secondary Operator Notice by sub-contractor and sub-contractor SWPPP Certification are placed into the general construction Contractor SWPPP.

The general construction Contractor shall file for Notice of Intent (NOI) as operator of the construction site. The most efficient process of filing

for NOI shall be utilized.

The mailing address for NOI and NOT is listed below. It is not the most efficient method for submitting NOI.

TEXAS

Mailing Address:

Texas Commission On Environmental Quality (TCEQ)
Storm Water & General Permits Team; MC-228
P.O. Box 13087
Austin, TX 78711-3087
(Use for regular and certified mail)

NOI Payment Address (by regular U.S. Mail):

Texas Commission on Environmental Quality (TCEQ)
Financial Administration Division
Cashier's Office, MC-214
P.O. Box 13088
Austin, TX 78711-3088

NOI Payment Physical Address:

Texas Commission on Environmental Quality (TCEQ)
Financial Administration Division
Cashier's Office, MC-214
12100 Park 35 Circle
Austin, TX 78753
(Use for overnight express carrier deliveries (U.S. Post
Office Express Mail, FED EX, UPS, etc.)

11.1.1.1 On-Site Construction Document, Signage, And Record-Keeping

A copy of each of the following shall be maintained at the project site at all times:

- USACE approved FINAL version of the Contractor operation activity specific SWP3 with required ATTACHMENTS (with divider and labeled tabs).
- TPDES TXR 150000 general construction storm water permit,
- Construction Site Notice (noted on-site location of SWPPP, signed and dated by the CEO of the general construction Contractor),
- Contractor NOI (signed and dated by the principal of construction Contractor)
- Contractor Certification of SWPPP (signed and dated by the principal of construction Contractor)
- Signatory Delegation Letter (signed and dated by the CEO of the construction Contractor)
- USACE Certification of SWPPP,
- NOI (Corps) for EPA NPDES or Secondary Large Construction Site Notice for TXR 150000

- Contractor and the USACE storm water discharge permits after receipt from the regulatory agency

The Contractor shall post the following near the main entrance of each construction access point.

- Construction Site Notice (construction Contractor)
- NOI (construction Contractor)
- NOI (Corps) for EPA NPDES or Secondary Large Construction Site Notice for TXR 150000
- Storm Water Permit authorization letter

The CONSTRUCTION SITE NOTICE shall have the following information: project start and completion date, a brief project description, name and telephone number of an operator's representative (for each Contractor & the USACE), the location of SWPPP, signature by the principal of the firm.

All records pertaining to the Storm Water Permit for discharging water from construction site are maintained, by the construction Contractor, for a minimum of three (3) years from the date that a Notice of Termination (NOT) is submitted to the regulatory agency.

11.1.2 Storm Water Discharge General Permit Fees And Fines For Non-Compliance

The Contractor shall be responsible for the initial Contractor storm water discharge permit NOI fee and the subsequent annual permit fees during construction. In addition, if a batch plant is on-site, the Contractor is responsible to obtain an annual sample of surface water discharged at the batch plant. A water sample for water quality analysis shall be analyzed by a state accredited laboratory and data shall be submitted to the regulatory agency for the batch plant operation.

Any fines levied by regulatory agency regarding non-compliance with TPDES Storm Water Discharge General Permit or the batch plant permit requirements stated in this section shall be the Contractor's responsibility.

11.1.3 Regulatory Inspector Visits

If the regulatory agency inspector visits the job site, the workers shall notify the Contractor Designated Storm Water Inspector immediately. The Contractor's Designated Inspector shall contact the Corps AOCO immediately and both of them shall accompany the regulatory agency inspector to walk the construction site. The Contractor's Designated Inspector shall brief workers daily on the BMP and the SWPPP, logistics of a regulatory agency inspector site visit, and avoid unattended regulatory agency inspector on job site. The Designated Inspector shall assign a responsible person in his absence to oversight the logistic of regulatory agency inspector site visit.

11.2 NOTICE OF TERMINATION (NOT)

Notice of Termination (NOT) is applicable for large construction activity. The regulatory agency will automatically send the annual storm water permit payment notice if a NOT is not received in the data base before a set date each year. The Contractor is responsible to pay annual fee on construction storm water discharge permit.

At establishment of final stabilization, contractor shall have Corps AOCO

approve final stabilization, remove sediment, remove BMP sediment controls, obtain pictures of permanently stabilized site and removal of BMP controls, and written approval from Corps AOCO. The Contractor shall prepare a Notice of Termination (NOT). The Contractor shall submit his/her own NOT to the appropriate regulatory agency. The Contractor shall provide two (2) copies of the filed NOT and site photos to the Corps AOCO. The AOCO shall retain a copy of NOT as project closure documentation and forward the other copy of NOT and photos to CESWF-PER-EE, Kathy Mitchell.

For small construction activity, the Contractor shall file a COMPLETION REPORT to the regulatory agency and the MS4. A copy of this Completion Report shall be provided to the Corps AOCO. NOTE: This requirement varies with the State. Contractor shall verify the state construction storm water general permit for submittal.

The Contractor is responsible for fines due to noncompliance with closure documentation for construction activity storm water discharge permit.

11.3 NOTIFICATION TO MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4)

A copy of NOI (for large construction site), a copy of NOC (if changes occurred after initial NOI is sent to the regulatory agency), shall be sent by the Contractor to notify all MS4 within the project site.

For small construction activity, the Contractor shall notify the MS4 in project area by submitting of a CONSTRUCTION SITE NOTICE.

PART 12 PERMIT REQUIRED RECORD FORMS AND SWPPP ATTACHMENTS, AND START WORK

The Contractor shall provide the following attachments (or permit required worksheets with labels and tabs) in the Contractor operation and construction activity specific SWPPP.

- PRIMARY OPERATOR LARGE CONSTRUCTION SITE NOTICE (for TX) (for NPDES permit use NPDES SITE NOTICE) (to be signed and dated by the principal of firm)
- SECONDARY OPERATOR LARGE CONSTRUCTION SITE NOTICE (for TX) (to be signed by Corps)
- CONSTRUCTION SITE NOTICE (SMALL CONSTRUCTION ACTIVITY for TX)
- CONTRACTOR NOTICE OF INTENT (NOI) signed and submitted by the principal of firm (NOTE: required for disturbed site of 5 acres or larger in TX)
- CONTRACTOR NOTICE OF TERMINATION (NOT) (required for disturbed site of 5 acres or large) (append a blank form in construction SWPPP) (once site completion is approved, the Corps AOCO will send a copy of NOT and site photos to the Corps District, PER-EE)
- CONTRACTOR STORM WATER CONTROL STRUCTURES INSPECTION AND MAINTENANCE REPORT
- CERTIFICATION OR NOTIFICATION for DRINKING WATER WELL AND/OR SEPTIC SYSTEM SANITARY SEWER SYSTEM
- RECORD OF SWPPP REVISION
(entry columns for problems noticed/date, corrections completed/ date)

- RECORD OF MAJOR CONSTRUCTION ACTIVITIES AND SUBSEQUENT STABILIZATION PRACTICES
(Content of a stand alone WORKSHEET with entry columns for each activity (install perimeter control, install cross drainage storm water control structures, sediment ponds, rock check dams, existing storm grate protection, clearing & grubbing, grading, utilities excavation, backfill & compaction, paving). For each activity identifies proposed date, actual disturbance date, stop work date, resume work date, stabilization date. Add inspector (name, title, and signature) for each entry)
- ANTICIPATED CONSTRUCTION TIMELINE
- SPILL RESPONSE ACTION (NOTES: if site is in TX, use TCEQ RG-285 and installation guide)
- CERTIFICATION FOR SWPPP by CONTRACTOR
(primary operator, day-to-day operator, signed by the principal of construction firm)
- CERTIFICATION FOR SWPPP by the CORPS
(secondary operator who controls plans and specs)
- RESPONSIBLE PARTIES FOR SITE POLLUTION PREVENTION MEASURES
(identify name and qualifications of Designated Site Inspector(s), training certificates, Part 1.2)
- DELEGATION LETTER for AUTHORIZED SIGNATORY
(signed & dated by the executive officer of construction firm)
- NON-STORM WATER DISCHARGE ASSESSMENT AND CERTIFICATION
- SWPPP AND BMP TRAINING LOG (certificates of individual responsible for training workers, Part 1.2)
- LIST of CONSTRUCTION MATERIALS, LOCATION AND METHOD OF CONTAINMENT and APPENDIX tab for MSDS (or indicate the central location of all MSDS at job site per 29 CFR 1910)
- LIST of WASTE ON-SITE, LOCATIONS AND METHOD OF STORAGE
- CONCRETE or ASPHALT BATCH PLANT ANNUAL DISCHARGE MONITORING RECORD (this worksheet is required if batch plant is on-site, the Contractor shall conduct annual batch plant surface runoff water quality test and submit data to the regulatory agency)
- A copy of ANNUAL DISCHARGE MONITORING RECORD of the batch plant to the regulatory agency
- A copy of applicable construction storm water General Permit language (reduce volumn of construction swppp by reducing the size of each page of permit verbiage, placing four (4) pages) of permit verbiage into a single letter size paper)

(include as an essential part of construction Contractor SWPPP, download from website)
- STORM WATER DISCHARGE PERMIT authorization letter issued by regulatory agency to the US Army Corps of Engineers (when applicable)

- STORM WATER DISCHARGE PERMIT authorization letter issued by regulatory agency to the CONTRACTOR

The Contractor shall not commence site clearing and grubbing until approval of the site specific construction and operation SWPPP, and when waiting period for the Notice of Intent is met.

-- End of Section --

SECTION 01 62 35

RECYCLED / RECOVERED MATERIALS

07/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 247

Comprehensive Procurement Guideline for
Products Containing Recovered Materials

1.2 OBJECTIVES

Government procurement policy is to acquire, in a cost effective manner, items containing the highest percentage of recycled and recovered materials practicable consistent with maintaining a satisfactory level of competition without adversely affecting performance requirements or exposing suppliers' employees to undue hazards from the recovered materials. The Environmental Protection Agency (EPA) has designated certain items which must contain a specified percent range of recovered or recycled materials. EPA designated products specified in this contract comply with the stated policy and with the EPA guidelines. The Contractor shall make all reasonable efforts to use recycled and recovered materials in providing the EPA designated products and in otherwise utilizing recycled and recovered materials in the execution of the work.

1.3 EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

Various sections of the specifications contain requirements for materials that have been designated by EPA as being products which are or can be made with recovered or recycled materials. These items, when incorporated into the work under this contract, shall contain at least the specified percentage of recycled or recovered materials unless adequate justification (non-availability) for non-use is provided. When a designated item is specified as an option to a non-designated item, the designated item requirements apply only if the designated item is used in the work.

1.4 EPA PROPOSED ITEMS INCORPORATED IN THE WORK

Products other than those designated by EPA are still being researched and are being considered for future Comprehensive Procurement Guideline (CPG) designation. It is recommended that these items, when incorporated in the work under this contract, contain the highest practicable percentage of recycled or recovered materials, provided specified requirements are also met.

1.5 EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

There are many products listed in 40 CFR 247 which have been designated or proposed by EPA to include recycled or recovered materials that may be used by the Contractor in performing the work but will not be incorporated into the work. These products include office products, temporary traffic control products, and pallets. It is recommended that these non-construction products, when used in the conduct of the work, contain the highest practicable percentage of recycled or recovered materials and that these products be recycled when no longer needed.

-- End of Section --

SECTION 01 74 19

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT
01/07

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM E 1609 (2001) Development and Implementation of a
Pollution Prevention Program

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED (2002; R 2005) Leadership in Energy and
Environmental Design(tm) Green Building
Rating System for New Construction
(LEED-NC)

1.2 GOVERNMENT POLICY

Government policy is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy the Contractor shall: (1) practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse. A minimum of 75 percent by weight of total project solid waste shall be diverted from the landfill.

1.3 MANAGEMENT

Develop and implement a waste management program in accordance with ASTM E 1609 and as specified. Take a pro-active, responsible role in the management of construction and demolition waste and require all subcontractors, vendors, and suppliers to participate in the effort. Construction and demolition waste includes products of demolition or removal, excess or unusable construction materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work. In the management of waste consideration shall be given to the availability of viable markets, the condition of the material, the ability to provide the material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates. The Contractor is responsible for implementation of any special programs involving rebates or similar incentives related to recycling of waste. Revenues or other savings obtained for salvage, or recycling accrue to the Contractor. Appropriately permit firms and facilities used for recycling, reuse, and disposal for the intended use to the extent required by federal, state, and local regulations. Also, provide on-site instruction of appropriate separation, handling, recycling, salvage, reuse, and return

methods to be used by all parties at the appropriate stages of the project.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Waste Management Plan; G (LEED)

SD-07 Certificates

Waste Diversion Report; G (LEED)

SD-11 Closeout Submittals

Records; (LEED)

1.5 MEETINGS

Conduct Construction Waste Management meetings. After award of the Contract and prior to commencement of work, schedule and conduct a meeting with the Contracting Officer to discuss the proposed Waste Management Plan and to develop a mutual understanding relative to the details of waste management. The requirements for this meeting may be fulfilled during the coordination and mutual understanding meeting outlined in Section 01 45 00.00 10 QUALITY CONTROL. At a minimum, environmental and waste management goals and issues shall be discussed at the following additional meetings:

- a. Pre-bid meeting.
- b. Preconstruction meeting.
- c. Regular QC meetings.
- d. Work safety meetings.

1.6 WASTE MANAGEMENT PLAN

A waste management plan shall be submitted within 15 days after contract award and not less than 10 days before the preconstruction meeting. The plan shall demonstrate how the project waste diversion goal shall be met and shall include the following:

- a. Name of individuals on the Contractor's staff responsible for waste prevention and management.
- b. Actions that will be taken to reduce solid waste generation, including coordination with subcontractors to ensure awareness and participation.
- c. Description of the regular meetings to be held to address waste management.

- d. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas on site and equipment to be used for processing, sorting, and temporary storage of wastes.
- e. Characterization, including estimated types and quantities, of the waste to be generated.
- f. Name of landfill and/or incinerator to be used and the estimated costs for use, assuming that there would be no salvage or recycling on the project.
- g. Identification of local and regional reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity. Include the name, location, and phone number for each reuse facility to be used, and provide a copy of the permit or license for each facility.
- h. List of specific waste materials that will be salvaged for resale, salvaged and reused on the current project, salvaged and stored for reuse on a future project, or recycled. Recycling facilities that will be used shall be identified by name, location, and phone number, including a copy of the permit or license for each facility.
- i. Identification of materials that cannot be recycled/reused with an explanation or justification, to be approved by the Contracting Officer.
- j. Description of the means by which any waste materials identified in item (h) above will be protected from contamination.
- k. Description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site).
- l. Anticipated net cost savings determined by subtracting Contractor program management costs and the cost of disposal from the revenue generated by sale of the materials and the incineration and/or landfill cost avoidance.

Revise and resubmit Plan as required by the Contracting Officer. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations or meeting project cumulative waste diversion requirement. Distribute copies of the Waste Management Plan to each subcontractor, the Quality Control Manager, and the Contracting Officer.

1.7 RECORDS

Records shall be maintained to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Records shall be kept in accordance with the LEED Reference Guide and using the LEED Letter Template. The records shall be made available to the Contracting Officer during construction, and a copy of the records shall be included in the LEED Documentation Notebook. In addition to the LEED Documentation Notebook, a quarterly WASTE DIVERSION REPORT shall be submitted. The report shall indicate the total amount of waste generated and total amount

of waste diverted in cubic yards or tons along with the percent that was diverted. The records (WASTE DIVERSION REPORT), including signed and dated waste delivery receipts, Bills of Lading for land disposed, incinerated, and recycled or reused materials are required. A copy of the records shall be delivered to the Contracting Officer and the Solid Waste Management Office of the facility owner. The report shall be submitted on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted and shall be for the previous quarter (e.g. the first working day of January, April, July, and October).

1.8 COLLECTION

Separate, store, protect, and handle at the site identified recyclable and salvageable waste products in a manner that maximizes recyclability and salvagability of identified materials. Provide the necessary containers, bins and storage areas to facilitate effective waste management and clearly and appropriately identify them. Provide materials for barriers and enclosures around recyclable material storage areas which are nonhazardous and recyclable or reusable. Locate out of the way of construction traffic. Provide adequate space for pick-up and delivery and convenience to subcontractors. Recycling and waste bin areas are to be kept neat and clean, and recyclable materials shall be handled to prevent contamination of materials from incompatible products and materials. Clean contaminated materials prior to placing in collection containers. Use cleaning materials that are nonhazardous and biodegradable. Handle hazardous waste and hazardous materials in accordance with applicable regulations and coordinate with Section 01 57 20.00 10 ENVIRONMENTAL PROTECTION contained in the Master MATOC Contract. Separate materials by one of the following methods:

1.8.1 Source Separated Method.

Waste products and materials that are recyclable shall be separated from trash and sorted as described below into appropriately marked separate containers and then transported to the respective recycling facility for further processing. Deliver materials in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process). Separate materials into the following category types as appropriate to the project waste and to the available recycling and reuse programs in the project area:

- a. Land clearing debris.
- b. Asphalt.
- c. Concrete and masonry.
- d. Metal (e.g. banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, lead brass, bronze).
 - (1) Ferrous.
 - (2) Non-ferrous.
- e. Wood (nails and staples allowed).
- f. Debris.

- g. Glass (colored glass allowed).
- h. Paper.
 - (1) Bond.
 - (2) Newsprint.
 - (3) Cardboard and paper packaging materials.
- i. Plastic.
 - (1) Type 1: Polyethylene Terephthalate (PET, PETE).
 - (2) Type 2: High Density Polyethylene (HDPE).
 - (3) Type 3: Vinyl (Polyvinyl Chloride or PVC).
 - (4) Type 4: Low Density Polyethylene (LDPE).
 - (5) Type 5: Polypropylene (PP).
 - (6) Type 6: Polystyrene (PS).
 - (7) Type 7: Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.
- j. Gypsum.
- k. Non-hazardous paint and paint cans.
- o. Beverage containers.

1.8.2 Co-Mingled Method.

Waste products and recyclable materials shall be placed into a single container and then transported to a recycling facility where the recyclable materials are sorted and processed.

1.8.3 Other Methods.

Other methods proposed by the Contractor may be used when approved by the Contracting Officer.

1.9 DISPOSAL

Control accumulation of waste materials and trash. Recycle or dispose of collected materials off-site at intervals approved by the Contracting Officer and in compliance with waste management procedures. Except as otherwise specified in other sections of the specifications, disposal shall be in accordance with the following:

1.9.1 Reuse.

First consideration shall be given to salvage for reuse since little or no re-processing is necessary for this method, and less pollution is created

when items are reused in their original form. Coordinate reuse with the Contracting Officer. Sale or donation of waste suitable for reuse shall be considered.

1.9.2 Recycle.

Waste materials not suitable for reuse, but having value as being recyclable, shall be made available for recycling. All fluorescent lamps, HID lamps, and mercury-containing thermostats removed from the site shall be recycled. Arrange for timely pickups from the site or deliveries to recycling facilities in order to prevent contamination of recyclable materials.

1.9.3 Waste.

Materials with no practical use or economic benefit shall be disposed at a landfill or incinerator.

1.9.4 Return

Set aside and protect misdelivered and substandard products and materials and return to supplier for credit.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used. -- End of Section --

SECTION 01 78 00.00 40

CLOSEOUT SUBMITTALS

10/09

PART 1 GENERAL

1.1 SUMMARY

The requirements of this Section apply to, and are a component part of each section of the specifications. The provisions of this section are in addition to and supplement the requirements of MATOC Contract Section "Closeout Submittal" within the MATOC Master Contract agreement.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

The following shall be submitted in accordance with paragraph entitled, "General," of this section.

Reproducible Drawings
CAD System Drawings

SD-02 Shop Drawings

Record Drawings shall be submitted in accordance with paragraph entitled, "General," of this section.

SD-03 Product Data

Spare Parts Data shall indicate manufacturer's name, part number, nomenclature, and stock level recommended for maintenance and repair. List those items that may be standard to the normal maintenance of the system.

SD-07 Certificates

A Work Plan shall be submitted in accordance with paragraph entitled, "General," of this section.

SD-08 Manufacturer's Instructions

The following shall be submitted in accordance with paragraph entitled, "General," of this section.

Preventative Maintenance and Inspection schedules shall be submitted by the Contractor with instructions that state when systems should be retested.

Schedule shall define the anticipated length of each test, test apparatus, number of personnel identified by responsibility, and a testing validation procedure permitting the record operation

capability requirements. Each test feature; e.g., gpm, rpm, psi, shall have a signoff blank for the Contractor and Contracting Officer. A remarks column of the testing validation procedure shall include references to operating limits of time, pressure, temperature, volume, voltage, current, acceleration, velocity, alignment, calibration, adjustments, cleaning, or special system notes. Procedures for preventative maintenance, condition monitoring (predictive testing) and inspection, adjustment, lubrication and cleaning necessary to prevent failure shall be delineated.

Posted Instructions

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals shall be submitted in accordance with paragraph entitled, "Operation and Maintenance," of this section.

1.3 GENERAL

Reproducible Drawings and CAD System Drawings shall be submitted as follows:

Three reproducible copy(s) of each drawing, product data record, or log and three CD's or DVD's with electronic PDF or TIFF files showing each drawing, product data record, or log shall be submitted for historical record. Three CD's or DVD's shall also be provided with the CADD files reflecting any deviations from the original documents. All drawings must be in AutoCAD 2005 format. The Government will provide the original CADD files for the Contractor's use.

Final drawings shall incorporate contract changes and plan deviations. Lines, letters, and details will be sharp, clear, and legible. Additions or corrections to the drawings will be drawn to the scale of the original drawing. One copy, marked with review notations by the Contracting Officer, will be returned to the Contractor. Drawings are to be resubmitted within 30 calendar days after the completion of the representative work effort.

Documents shall be current. Contractor shall not conceal record information until Record Drawings have been made. Record drawings shall be submitted with a transmittal letter containing date, project title, Contractor's name and address, document list, and Contractor's signature.

Record Drawings shall be submitted under the following criteria:

In order to minimize the time for final payment at the completion of the project, the Contractor shall update the Record Drawings every month with the Contracting Officer's authorized representative. This update will be a part of "the monthly request for payment meeting," and payment--or a portion of the payment, including final payment--may be withheld until the Record Drawings have been updated, and accepted by the Contracting Officer. The monthly update shall include the incorporation of the field mark-ups into the CAD documents and a CD with the in-progress mark-ups shall be submitted with each payment request.

After completion of all construction and before final payment is made

under this contract, the Contractor shall provide the Contracting Officer with one complete set of CAD system drawings with all changes clearly identifiable on the computer screen along with one hard copy of the same. All drawings shall be in AutoCAD 2005 format.

Preventative Maintenance and Inspection schedules shall be submitted by the Contractor with instructions that state when systems should be retested.

Schedule shall define the anticipated length of each test, test apparatus, number of personnel identified by responsibility, and a testing validation procedure permitting the record operation capability requirements. Each test feature; e.g., volts, amps, gpm, rpm, psi, etc., shall have a signoff blank for the Contractor and Contracting Officer. A remarks column of the testing validation procedure shall include references to operating limits of time, pressure, temperature, volume, voltage, current, acceleration, velocity, alignment, calibration, adjustments, cleaning, or special system notes. Procedures for preventative maintenance, inspection, adjustment, lubrication and cleaning necessary to minimize corrective maintenance and repair shall be delineated.

Repair requirements shall inform operators how to check out, troubleshoot, repair, and replace components of the system. Instructions shall include electrical and mechanical schematics and diagrams and diagnostic techniques necessary to enable operation and troubleshooting of the system after acceptance.

A Work Plan shall be submitted to the Contracting Officer for project closeout. Plan shall include all scheduled inspections, instruction classes, items, closeout dates for all functions, and shall list the required Government and Contractor personnel that will be taking part in these functions.

Posted Instructions shall be submitted by the Contractor with labels, signs, and templates of operating instructions that are required to be mounted or installed on or near the product for normal, safe operation.

Contractor shall submit 6 copies of the project operation and maintenance manuals 30 calendar days prior to testing the system involved. Data shall be updated and resubmitted for final approval no later than 30 calendar days prior to contract completion.

Spare Parts Data shall indicate manufacturer's name, part number, nomenclature, and stock level required for maintenance and repair. List those items that may be standard to the normal maintenance of the system.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 OPERATION AND MAINTENANCE

Operation and Maintenance Manuals shall be consistent with the manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Information shall be bound in manual format and grouped by technical sections. Test data shall be legible and of good quality. Light-sensitive reproduction techniques are acceptable provided finished pages are clear, legible, and not subject

to fading. Pages for vendor data and manuals shall have 0.3937-inch holes and be bound in 3-ring, loose-leaf binders. Data shall be organized by separate index and tabbed sheets, in a loose-leaf binder. Binder shall lie flat with printed sheets that are easy to read. Caution and warning indications shall be clearly labeled.

Contractor shall submit classroom and field instructions in the operation and maintenance of systems equipment where required by the technical provisions. These services shall be directed by the Contractor, using the manufacturer's factory-trained personnel or qualified representatives. Contracting Officer shall be given 7 calendar days written notice of scheduled instructional services. Instructional materials belonging to the manufacturer or vendor, such as lists, static exhibits, and visual aids, shall be made available to the Contracting Officer.

-- End of Section --

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

07/06

PART 1 GENERAL

1.1 SUBMISSION OF OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data specifically applicable to this contract and a complete and concise depiction of the provided equipment, product, or system, stressing and enhancing the importance of system interactions, troubleshooting, and long-term preventative maintenance and operation. The subcontractors shall compile and prepare data and deliver to the Contractor prior to the training of Government personnel. The Contractor shall compile and prepare aggregate O&M data including clarifying and updating the original sequences of operation to as-built conditions. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit in accordance with this section and Section 01 33 00 SUBMITTAL PROCEDURES.

1.1.1 Package Quality

Documents must be fully legible. Poor quality copies and material with hole punches obliterating the text or drawings will not be accepted.

1.1.2 Package Content

Data package content shall be as shown in the paragraph titled "Schedule of Operation and Maintenance Data Packages." Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission, except as follows. Commissioned items without a specified data package requirement in the individual technical sections shall use Data Package 4. Commissioned items with a Data Package 1 or 2 requirement shall use instead Data Package 5.

1.1.3 Changes to Submittals

Manufacturer-originated changes or revisions to submitted data shall be furnished by the Contractor if a component of an item is so affected subsequent to acceptance of the O&M Data. Changes, additions, or revisions required by the Contracting Officer for final acceptance of submitted data, shall be submitted by the Contractor within 30 calendar days of the notification of this change requirement.

1.1.4 Review and Approval

The Government's Commissioning Authority (CA) shall review the commissioned systems and equipment submittals for completeness and applicability. The Government shall verify that the systems and equipment provided meet the requirements of the Contract documents and design intent, particularly as they relate to functionality, energy performance, water performance, maintainability, sustainability, system cost, indoor environmental quality, and local environmental impacts. This work shall be in addition to the normal review procedures for O&M data.

1.1.5 O&M Database

Develop a database from the O&M manuals that contains the information required to start a preventative maintenance program.

1.2 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

1.2.1 Operating Instructions

Include specific instructions, procedures, and illustrations for the following phases of operation for the installed model and features of each system:

1.2.1.1 Safety Precautions

List personnel hazards and equipment or product safety precautions for all operating conditions.

1.2.1.2 Operator Prestart

Include procedures required to install, set up, and prepare each system for use.

1.2.1.3 Startup, Shutdown, and Post-Shutdown Procedures

Provide narrative description for Startup, Shutdown and Post-shutdown operating procedures including the control sequence for each procedure.

1.2.1.4 Normal Operations

Provide narrative description of Normal Operating Procedures. Include Control Diagrams with data to explain operation and control of systems and specific equipment.

1.2.1.5 Emergency Operations

Include Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance and procedures for emergency operation of all utility systems including required valve positions, valve locations and zones or portions of systems controlled.

1.2.1.6 Operator Service Requirements

Include instructions for services to be performed by the operator such as lubrication, adjustment, inspection, and recording gage readings.

1.2.1.7 Environmental Conditions

Include a list of Environmental Conditions (temperature, humidity, and other relevant data) that are best suited for the operation of each product, component or system. Describe conditions under which the item equipment should not be allowed to run.

1.2.2 Preventive Maintenance

Include the following information for preventive and scheduled maintenance

to minimize corrective maintenance and repair for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.2.2.1 Lubrication Data

Include preventative maintenance lubrication data, in addition to instructions for lubrication provided under paragraph titled "Operator Service Requirements":

- a. A table showing recommended lubricants for specific temperature ranges and applications.
- b. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.
- c. A Lubrication Schedule showing service interval frequency.

1.2.2.2 Preventive Maintenance Plan and Schedule

Include manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation and to minimize corrective maintenance. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each separate operation.

1.2.3 Corrective Maintenance (Repair)

Include manufacturer's recommended procedures and instructions for correcting problems and making repairs.

1.2.3.1 Troubleshooting Guides and Diagnostic Techniques

Include step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.2.3.2 Wiring Diagrams and Control Diagrams

Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation configuration and numbering.

1.2.3.3 Maintenance and Repair Procedures

Include instructions and a list of tools required to repair or restore the product or equipment to proper condition or operating standards.

1.2.3.4 Removal and Replacement Instructions

Include step-by-step procedures and a list required tools and supplies for

removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.

1.2.3.5 Spare Parts and Supply Lists

Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead-time to obtain.

1.2.4 Corrective Maintenance Work-Hours

Include manufacturer's projection of corrective maintenance work-hours including requirements by type of craft. Corrective maintenance that requires completion or participation of the equipment manufacturer shall be identified and tabulated separately.

1.2.5 Appendices

Provide information required below and information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment. Include the following:

1.2.5.1 Product Submittal Data

Provide a copy of all SD-03 Product Data submittals required in the applicable technical sections.

1.2.5.2 Manufacturer's Instructions

Provide a copy of all SD-08 Manufacturer's Instructions submittals required in the applicable technical sections.

1.2.5.3 O&M Submittal Data

Provide a copy of all SD-10 Operation and Maintenance Data submittals required in the applicable technical sections.

1.2.5.4 Parts Identification

Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number that will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies in accordance with the manufacturer's standard practice. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as typically shown in a master parts catalog

1.2.5.5 Warranty Information

List and explain the various warranties and clearly identify the servicing and technical precautions prescribed by the manufacturers or contract documents in order to keep warranties in force. Include warranty information for primary components such as the compressor of air conditioning system.

1.2.5.6 Personnel Training Requirements

Provide information available from the manufacturers that is needed for use in training designated personnel to properly operate and maintain the equipment and systems.

1.2.5.7 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.

1.2.5.8 Testing and Performance Data

Include completed prefunctional checklists, functional performance test forms, and monitoring reports. Include recommended schedule for retesting and blank test forms.

1.2.5.9 Contractor Information

Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name address and telephone number of the manufacturer's representative and service organization that can provide replacements most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.

1.3 TYPES OF INFORMATION REQUIRED IN CONTROLS O&M DATA PACKAGES

Include Data Package 5 and the following for control systems:

- a. Narrative description on how to perform and apply all functions, features, modes, and other operations, including unoccupied operation, seasonal changeover, manual operation, and alarms. Include detailed technical manual for programming and customizing control loops and algorithms.
- b. Full as-built sequence of operations.
- c. Copies of all checkout tests and calibrations performed by the Contractor (not Cx tests).
- f. Full as-built print out of software program.
- g. Electronic copy on disk or CD of the entire program for this facility.

1.4 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Furnish the O&M data packages specified in individual technical sections.

The required information for each O&M data package is as follows:

1.4.1 Data Package 4

- a. Safety precautions
- b. Operator prestart
- c. Startup, shutdown, and post-shutdown procedures
- d. Normal operations
- e. Emergency operations
- f. Operator service requirements
- g. Environmental conditions
- h. Lubrication data
- i. Preventive maintenance plan and schedule
- j. Cleaning recommendations
- k. Troubleshooting guides and diagnostic techniques
- l. Wiring diagrams and control diagrams
- m. Maintenance and repair procedures
- n. Removal and replacement instructions
- o. Spare parts and supply list
- p. Corrective maintenance man-hours
- q. Product submittal data
- r. O&M submittal data
- s. Parts identification
- t. Warranty information
- u. Personnel training requirements
- v. Testing equipment and special tool information
- w. Testing and performance data
- x. Contractor information

1.4.2 Data Package 5

- a. Safety precautions
- b. Operator prestart
- c. Start-up, shutdown, and post-shutdown procedures

- d. Normal operations
- e. Environmental conditions
- f. Preventive maintenance plan and schedule
- g. Troubleshooting guides and diagnostic techniques
- h. Wiring and control diagrams
- i. Maintenance and repair procedures
- j. Removal and replacement instructions
- k. Spare parts and supply list
- l. Product submittal data
- m. Manufacturer's instructions
- n. O&M submittal data
- o. Parts identification
- p. Testing equipment and special tool information
- q. Warranty information
- r. Testing and performance data
- s. Contractor information

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 02 41 00

DEMOLITION

10/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO M 145 (1991; R 2004) Classification of Soils and
Soil-Aggregate Mixtures for Highway
Construction Purposes

AASHTO T 180 (2001; R 2004) Moisture-Density Relations
of Soils Using a 4.54-kg (10-lb) Rammer
and an 457-mm (18-in) Drop

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.6 (2006) Safety Requirements for Demolition
Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2003) Safety -- Safety and Health
Requirements

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 61 National Emission Standards for Hazardous
Air Pollutants

1.2 GENERAL REQUIREMENTS

Do not begin work until authorization is received from the Contracting Officer. The work includes demolition and removal of resulting rubbish and debris. Remove rubbish and debris from the project site daily, unless otherwise directed. Store materials that cannot be removed daily in areas specified by the Contracting Officer. In the interest of occupational safety and health, perform the work in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Existing Conditions

SD-07 Certificates

Demolition Plan
Notifications

Proposed demolition, and removal procedures for approval before work is started.

SD-11 Closeout Submittals

Receipts or bills of lading, as specified.

1.4 REGULATORY AND SAFETY REQUIREMENTS

Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ASSE/SAFE A10.6.

1.4.1 Notifications

1.4.1.1 General Requirements

Notify the Contracting Officer in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61, Subpart M.

1.5 DUST AND DEBRIS CONTROL

Prevent the spread of dust and debris and avoid the creation of a nuisance in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution.

1.6 PROTECTION

1.6.1 Existing Conditions Documentation

Before beginning any demolition work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the Contracting Officer showing the condition of structures and other facilities adjacent to areas of removal. Photographs sized 4 inch will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish floor elevations, possible conflicting electrical conduits, plumbing lines, alarms systems, the location and extent of existing cracks and other damage and description of surface conditions that exist prior to before starting work. It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document.

1.6.2 Items to Remain in Place

Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government. Repair or replace damaged items as approved by the Contracting Officer. Coordinate the work of this section with all other work indicated.

Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload existing pavements. Provide new supports and reinforcement for existing construction weakened by demolition or removal work. Repairs, reinforcement, or structural replacement require approval by the Contracting Officer prior to performing such work.

1.6.3 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated on the drawings or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove dust, dirt, and debris from work areas daily.

1.6.4 Trees

Protect trees within the project site which might be damaged during demolition or deconstruction, and which are indicated to be left in place, by a 6 foot high fence. Erect and secure fence a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Replace any tree designated to remain that is damaged during the work under this contract with like-kind or as approved by the Contracting Officer.

1.6.5 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition operations. Prior to start of work, utilities serving each area of alteration or removal will be shut off by the Government and disconnected and sealed by the Contractor.

1.6.6 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities.

1.7 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.8 FOREIGN OBJECT DAMAGE (FOD)

If necessary, the Contracting Officer may require the Contractor to install a temporary barricade at the Contractor's expense to control the spread of FOD potential debris. The barricade must include a fence covered with a fabric designed to stop the spread of debris.

1.9 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Items to be relocated which are damaged by the Contractor shall be repaired or replaced with new undamaged

items as approved by the Contracting Officer.

1.10 REQUIRED DATA

Prepare a demolition plan. Provide procedures for safe conduct of the work in accordance with EM 385-1-1. Plan shall be approved by Contracting Officer prior to work beginning.

1.11 ENVIRONMENTAL PROTECTION

Comply with the details and requirements as shown on the plans.

1.12 USE OF EXPLOSIVES

Use of explosives will not be permitted.

1.13 AVAILABILITY OF WORK AREAS

Areas in which the work is to be accomplished will be available in accordance with the directions of the Contracting Officer.

PART 2 PRODUCTS

2.1 FILL MATERIAL

Comply with excavating, backfilling, and compacting procedures for soils used as backfill material to fill voids, depressions or excavations resulting from demolition of structures.

Fill material must conform to the definition of satisfactory soil material as defined in AASHTO M 145, Soil Classification Groups A-1, A-2-4, A-2-5 and A-3. In addition, fill material must be free from roots and other organic matter, trash, debris, frozen materials, and stones larger than 2 inches in any dimension.

Proposed fill material must be sampled and tested by an approved soil testing laboratory, as follows:

Soil classification	AASHTO M 145
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Moisture-density relations	AASHTO T 180, Method B or D
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PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

3.1.1 Utilities and Related Equipment

3.1.1.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Contracting Officer and only after temporary utility services have been approved and provided. Do not begin demolition or deconstruction work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

3.1.1.2 Disconnecting Existing Utilities

Remove existing utilities , as indicated uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer. When utility lines are encountered that are not indicated on the drawings, the Contracting Officer shall be notified prior to further work in that area. Remove meters and related equipment and deliver to a location in accordance with instructions of the Contracting Officer.

3.1.2 Chain Link Fencing

Remove chain link fencing, gates and other related items scheduled for removal and transport to designated areas.

3.1.3 Paving and Slabs

Remove existing asphaltic or concrete paving and aggregate base as indicated. Provide neat sawcuts at limits of pavement removal as indicated. Also, remove any concrete slabs, as indicated on drawings.

3.1.4 Concrete Foundation Pads

Existing concrete foundation pads shall be demolished by mechanical methods. They shall be completely removed. Contractor shall remove all concrete foundation piers and reinforced concrete valve vaults. Method of removal shall be by jack-hammering, saw cutting, lifting, etc. Contractor shall submit method of removal prior to start of work.

3.1.5 Patching

Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes with an approved patching material. Damaged surfaces shall match adjacent finished surfaces.

3.2 CONCURRENT EARTH-MOVING OPERATIONS

Do not begin excavation, filling, and other earth-moving operations that are sequential to demolition work in areas occupied by structures to be demolished until all demolition in the area has been completed and debris removed. Fill holes, and other hazardous openings.

3.3 DISPOSITION OF MATERIAL

3.3.1 Title to Materials

Shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition and materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition, deconstruction, and removal procedures, and authorization by the Contracting Officer to begin demolition. The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.

3.4 CLEANUP

Remove and transport debris and rubbish in a manner that prevents spillage

on streets or adjacent areas.

3.5 DISPOSAL OF REMOVED MATERIALS

3.5.1 Regulation of Removed Materials

Dispose of debris, rubbish, scrap, and other materials resulting from removal operations with all applicable federal, state and local regulations as contractually specified. Storage of removed materials on the project site is prohibited.

3.5.2 Burning on Government Property

Burning of materials removed from demolished structures will not be permitted on Government property.

3.5.3 Removal from Government Property

Transport waste materials removed from demolished and deconstructed structures from Government property for legal disposal. Dispose of waste soil as indicated or directed.

-- End of Section --

SECTION 03 15 13.00 10

EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS

11/09

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO T 111 (2009) Inorganic Matter or Ash in
Bituminous Materials

ASTM INTERNATIONAL (ASTM)

ASTM A 1011/A 1011M (2009a) Standard Specification for Steel,
Sheet, and Strip, Hot-Rolled, Carbon,
Structural, High-Strength Low-Alloy and
High-Strength Low-Alloy with Improved
Formability

ASTM A 109/A 109M (2008) Standard Specification for Steel,
Strip, Carbon (0.25 Maximum Percent),
Cold-Rolled

ASTM A 167 (1999; R 2009) Standard Specification for
Stainless and Heat-Resisting
Chromium-Nickel Steel Plate, Sheet, and
Strip

ASTM A 480/A 480M (2009) Standard Specification for General
Requirements for Flat-Rolled Stainless and
Heat-Resisting Steel Plate, Sheet, and
Strip

ASTM B 152/B 152M (2006a) Standard Specification for
Copper Sheet, Strip, Plate, and Rolled Bar

ASTM B 370 (2009) Standard Specification for Copper
Sheet and Strip for Building Construction

ASTM C 920 (2008) Standard Specification for
Elastomeric Joint Sealants

ASTM D 1751 (2004; R 2008) Standard Specification for
Preformed Expansion Joint Filler for
Concrete Paving and Structural
Construction (Nonextruding and Resilient
Bituminous Types)

ASTM D 1752 (2004a; R 2008) Standard Specification for

	Preformed Sponge Rubber Cork and Recycled PVC Expansion
ASTM D 2628	(1991; R 2005) Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
ASTM D 2835	(1989; R 2007) Lubricant for Installation of Preformed Compression Seals in Concrete Pavements
ASTM D 4	(1986; R 2004) Bitumen Content
ASTM D 412	(2006ae1e2) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D 471	(2006; R 2008) Standard Test Method for Rubber Property - Effect of Liquids
ASTM D 5249	(1995; R 2006) Backer Material for Use with Cold-and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints
ASTM D 6	(1995; R 2006) Loss on Heating of Oil and Asphaltic Compounds
ASTM D 7116	(2005) Standard Specification for Joint Sealants, Hot Applied, Jet Fuel Resistant Types, for Portland Cement Concrete

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 513	(1974) Specifications for Rubber Waterstops
COE CRD-C 572	(1974) Specifications for Polyvinylchloride Waterstops

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Waterstops; G

Shop drawings and fabrication drawings provided by the manufacturer or prepared by the Contractor.

SD-03 Product Data

Preformed Expansion Joint Filler
Sealant
Waterstops

Manufacturer's literature, including safety data sheets, for preformed fillers and the lubricants used in their installation; field-molded sealants and primers (when required by sealant manufacturer); preformed compression seals; and waterstops. Manufacturer's recommended instructions for installing preformed fillers, field-molded sealants; preformed compression seals; and waterstops; and for splicing non-metallic waterstops.

SD-04 Samples

Lubricant for Preformed Compression Seals

Specimens identified to indicate the manufacturer, type of material, size and quantity of material, and shipment or lot represented. Each sample shall be a piece not less than 9 ft of 1 inch nominal width or wider seal or a piece not less than 12 ft of compression seal less than 1 inch nominal width. Provide one quart of lubricant.

Field-Molded Type

One gallon of field-molded sealant and one quart of primer (when primer is recommended by the sealant manufacturer) identified to indicate manufacturer, type of material, quantity, and shipment or lot represented.

Non-metallic Materials

Specimens identified to indicate manufacturer, type of material, size, quantity of material, and shipment or lot represented. Each sample shall be a piece not less than 12 inch long cut from each 200 ft of finished waterstop furnished, but not less than a total of 4 ft of each type, size, and lot furnished. One splice sample of each size and type for every 50 splices made in the factory and every 10 splices made at the job site. The splice samples shall be made using straight run pieces with the splice located at the mid-length of the sample and finished as required for the installed waterstop. The total length of each splice shall be not less than 12 inches long.

SD-07 Certificates

Preformed Expansion Joint Filler Sealant Waterstops

Certificates of compliance stating that the joint filler and sealant materials and waterstops conform to the requirements specified.

1.3 DELIVERY, STORAGE, AND HANDLING

Protect material delivered and placed in storage off the ground from moisture, dirt, and other contaminants. Deliver sealants in the manufacturer's original unopened containers. Sealants whose shelf life has expired shall be removed from the site.

PART 2 PRODUCTS

2.1 PREFORMED EXPANSION JOINT FILLER

Expansion joint filler shall be preformed material conforming to ASTM D 1751 or ASTM D 1752. Unless otherwise indicated, filler material shall be 3/8 inch thick and of a width applicable for the joint formed. Backer material, when required, shall conform to ASTM D 5249.

2.2 SEALANT

Joint sealant shall conform to the following:

2.2.1 Preformed Polychloroprene Elastomeric Type

ASTM D 2628.

2.2.2 Lubricant for Preformed Compression Seals

ASTM D 2835.

2.2.3 Field-Molded Type

ASTM C 920, Type M, Grade P or NS, Class 25, Use T for horizontal joints. Type M, Grade NS, Class 25, Use NT for vertical joints. Bond breaker material shall be polyethylene tape, coated paper, metal foil or similar type materials. The back-up material shall be compressible, non-shrink, nonreactive with sealant, and non-absorptive material type such as extruded butyl or polychloroprene rubber.

2.2.4 Hot-Applied Jet-Fuel Resistant Type

ASTM D 7116, Type II

2.3 WATERSTOPS

Intersection and change of direction waterstops shall be shop fabricated.

2.3.1 Flexible Metal

Copper waterstops shall conform to ASTM B 152/B 152M and ASTM B 370, O60 soft anneal temper and 20 oz mass per sq ft sheet thickness. Stainless steel waterstops shall conform to ASTM A 167 and ASTM A 480/A 480M, UNS S30453 (Type 304L), and 20 gauge thick strip.

2.3.2 Rigid Metal

Flat steel waterstops shall conform to ASTM A 109/A 109M, No. 2 (half hard) temper, No. 2 edge, No. 1 (matte or dull) finish or ASTM A 1011/A 1011M, Grade 40.

2.3.3 Non-Metallic Materials`

Non-metallic waterstops shall be manufactured from a prime virgin resin; reclaimed material is not acceptable. The compound shall contain plasticizers, stabilizers, and other additives to meet specified requirements. Rubber waterstops shall conform to COE CRD-C 513. Polyvinylchloride waterstops shall conform to COE CRD-C 572. Thermoplastic elastomeric rubber waterstops shall conform to ASTM D 471.

2.3.4 Non-Metallic Hydrophilic

Swellable strip type compound of polymer modified chloroprene rubber that swells upon contact with water shall conform to ASTM D 412 as follows: Tensile strength 420 psi minimum; ultimate elongation 600 percent minimum. Hardness shall be 50 minimum on the type A durometer and the volumetric expansion ratio in distilled water at 70 degrees F shall be 3 to 1 minimum.

2.3.5 Preformed Elastic Adhesive

Preformed plastic adhesive waterstops shall be produced from blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler, and shall contain no solvents, asbestos, irritating fumes or obnoxious odors. The compound shall not depend on oxidizing, evaporating, or chemical action for its adhesive or cohesive strength.

2.3.5.1 Chemical Composition

The chemical composition of the sealing compound shall meet the requirements shown below:

PERCENT BY WEIGHT			
COMPONENT	MIN.	MAX.	TEST
Bitumen (Hydrocarbon plastic)	50	70	ASTM D 4
Inert Mineral Filler	30	50	AASHTO T 111
Volatile Matter		2	ASTM D 6

2.3.5.2 Adhesion Under Hydrostatic Pressure

The sealing compound shall not leak at the joints for a period of 24 hours under a vertical 6 foot head pressure. In a separate test, the sealing compound shall not leak under a horizontal pressure of 10 psi which is reached by slowly applying increments of 2 psi every minute.

2.3.5.3 Sag of Flow Resistance

Sagging shall not be detected when tested as follows: Fill a wooden form 1 inch wide and 6 inches long flush with sealing compound and place in an oven at 135 degrees F in a vertical position for 5 days.

2.3.5.4 Chemical Resistance

The sealing compound when immersed separately in a 5% solution of caustic potash, a 5% solution of hydrochloric acid, 5% solution of sulfuric acid and a saturated hydrogen sulfide solution for 30 days at ambient room temperature shall show no visible deterioration.

PART 3 EXECUTION

3.1 JOINTS

Install joints at locations indicated and as authorized.

3.1.1 Contraction Joints

Contraction joints to be constructed by cutting the concrete with a saw

after concrete has set. Joints shall be approximately 1/2 inch wide and shall extend into the slab one-fourth the slab thickness, minimum, but not less than 1 inch.

3.1.1.1 Sawed Joints

Joint sawing shall be early enough to prevent uncontrolled cracking in the slab, but late enough that this can be accomplished without appreciable spalling. Use concrete sawing machines that are adequate in number and power, and with sufficient replacement blades to complete the sawing at the required rate. Cut joints to true alignment and in sequence of concrete placement. Remove sludge and cutting debris.

3.1.2 Expansion Joints

Use preformed expansion joint filler in expansion and isolation joints in slabs around columns and between slabs on grade and vertical surfaces where indicated. The filler shall extend the full slab depth, unless otherwise indicated. The edges of the joint shall be neatly finished with an edging tool of 1/4 inch chamfer, except where a resilient floor surface will be applied. Where the joint is to receive a sealant, the filler strips shall be installed at the proper level below the finished floor with a slightly tapered, dressed and oiled wood strip temporarily secured to the top to form a recess to the size shown on the drawings. The wood strip shall be removed after the concrete has set. Contractor may opt to use a removable expansion filler cap designed and fabricated for this purpose in lieu of the wood strip. The groove shall be thoroughly cleaned of laitance, curing compound, foreign materials, protrusions of hardened concrete, and any dust which shall be blown out of the groove with oil-free compressed air.

3.1.3 Joint Sealant

Sawed contraction joints and expansion joints in slabs shall be filled with joint sealant, unless otherwise shown. Joint surfaces shall be clean, dry, and free of oil or other foreign material which would adversely affect the bond between sealant and concrete. Joint sealant shall be applied as recommended by the manufacturer of the sealant.

3.1.3.1 Joints With Field-Molded Sealant

Joints shall not be sealed when the sealant material, ambient air, or concrete temperature is less than 40 degrees F. Joints requiring a bond breaker shall be coated with curing compound or with bituminous paint. Bond breaker and back-up material shall be installed where required. Joints shall be primed and filled flush with joint sealant in accordance with the manufacturer's recommendations.

3.2 WATERSTOPS, INSTALLATION AND SPLICES

Install waterstops at the locations shown to form a continuous water-tight diaphragm. Make adequate provision to support and completely protect the waterstops during the progress of the work. Any waterstop punctured or damaged shall be repaired or replaced. Protect exposed waterstops during application of form release agents to avoid being coated. Provide suitable guards to protect exposed projecting edges and ends of partially embedded waterstops from damage when concrete placement has been discontinued. Splices shall be made by certified trained personnel using approved equipment and procedures.

3.2.1 Copper And Stainless Steel

Splices in copper waterstops shall be lap joints made by brazing. Splices in stainless steel waterstops shall be welded using a TIG or MIG process utilizing a weld rod to match the stainless. All welds shall not be annealed to maintain physical properties. Carbon flame shall not be used in the annealing process. Damaged waterstops shall be repaired by removing damaged portions and patching. Patches shall overlap a minimum of 1 inch onto undamaged portion of the waterstop.

3.2.2 Flat Steel

Splices in flat steel waterstops shall be properly aligned, butt welded, and cleaned of excessive material.

3.2.3 Non-Metallic

Fittings shall be shop made using a machine specifically designed to mechanically weld the waterstop. A miter guide, proper fixturing (profile dependant), and portable power saw shall be used to miter cut the ends to be joined to ensure good alignment and contact between joined surfaces. The splicing of straight lengths shall be done by squaring the ends to be joined. Continuity of the characteristic features of the cross section of the waterstop (ribs, tabular center axis, protrusions, etc.) shall be maintained across the splice.

3.2.3.1 Rubber Waterstop

Splices shall be vulcanized or shall be made using cold bond adhesive as recommended by the manufacturer. Splices for TPE-R shall be as specified for PVC.

3.2.3.2 Polyvinyl Chloride Waterstop

Make splices by heat sealing the adjacent waterstop edges together using a thermoplastic splicing iron utilizing a non-stick surface specifically designed for waterstop welding. The correct temperature shall be used to sufficiently melt without charring the plastic. The spliced area, when cooled, shall show no signs of separation, holes, or other imperfections when bent by hand in as sharp an angle as possible.

3.2.3.3 Quality Assurance

Edge welding will not be permitted. Centerbulbs shall be compressed or closed when welding to non-centerbulb type. Waterstop splicing defects which are unacceptable include, but are not limited to the following: 1) Tensile strength less than 80 percent of parent section. 2) Free lap joints. 3) Misalignment of centerbulb, ribs, and end bulbs greater than 1/16 inch. 4) Misalignment which reduces waterstop cross section more than 15 percent. 5) Bond failure at joint deeper than 1/16 inch or 15 percent of material thickness. 6) Misalignment of waterstop splice resulting in misalignment of waterstop in excess of 1/2 inch in 10 feet. 7) Visible porosity in the weld area, including pin holes. 8) Charred or burnt material. 9) Bubbles or inadequate bonding. 10) Visible signs of splice separation when cooled splice is bent by hand at a sharp angle.

3.2.4 Non-Metallic Hydrophilic Waterstop Installation

Ends to be joined shall be miter cut with sharp knife or shears. The ends

shall be adhered with cyanacrylate (super glue) adhesive. When joining hydrophilic type waterstop to PVC waterstop, the hydrophilic waterstop shall be positioned as shown on the drawings. A liberal amount of a single component hydrophilic sealant shall be applied to the junction to complete the transition.

3.2.5 Preformed Plastic Adhesive Installation

The installation of preformed plastic adhesive waterstops shall be a prime, peel, place and pour procedure. Joint surfaces shall be clean and dry before priming and just prior to placing the sealing strips. The end of each strip shall be spliced to the next strip with a 1 inch overlap; the overlap shall be pressed firmly to release trapped air. During damp or cold conditions the joint surface shall be flashed with a safe, direct flame to warm and dry the surface adequately; the sealing strips shall be dipped in warm water to soften the material to achieve maximum bond to the concrete surface.

3.3 CONSTRUCTION JOINTS

Construction joints are specified in Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE except that construction joints coinciding with expansion and contraction joints shall be treated as expansion or contraction joints as applicable.

-- End of Section --

SECTION 03 20 01.00 10

CONCRETE REINFORCEMENT
10/07

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 318/318R (2005) Building Code Requirements for
Structural Concrete and Commentary

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4/D1.4M (2005; Errata 2005) Structural Welding
Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 184/A 184M (2006) Standard Specification for
Fabricated Deformed Steel Bar Mats for
Concrete Reinforcement

ASTM A 185/A 185M (2007) Standard Specification for Steel
Welded Wire Reinforcement, Plain, for
Concrete

ASTM A 615/A 615M (2009) Standard Specification for Deformed
and Plain Carbon-Steel Bars for Concrete
Reinforcement

ASTM A 767/A 767M (2005) Standard Specification for
Zinc-Coated (Galvanized) Steel Bars for
Concrete Reinforcement

ASTM A 775/A 775M (2006) Standard Specification for
Epoxy-Coated Steel Reinforcing Bars

ASTM A 82/A 82M (2007) Standard Specification for Steel
Wire, Plain, for Concrete Reinforcement

ASTM A 884/A 884M (2006) Standard Specification for
Epoxy-Coated Steel Wire and Welded Wire
Reinforcement

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP (2001; 27Ed) Manual of Standard Practice

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Reinforcement; G

Detail drawings showing reinforcing steel placement, schedules, sizes, grades, and splicing and bending details. Drawings shall show support details including types, sizes and spacing.

SD-03 Product Data

Welding

A list of qualified welders names.

SD-07 Certificates

Reinforcing Steel

Certified copies of mill reports attesting that the reinforcing steel furnished contains no less than 25 percent recycled scrap steel and meets the requirements specified herein, prior to the installation of reinforcing steel.

1.3 WELDING

Welders shall be qualified in accordance with AWS D1.4/D1.4M. Qualification test shall be performed at the worksite and the Contractor shall notify the Contracting Officer 24 hours prior to conducting tests. Special welding procedures and welders qualified by others may be accepted as permitted by AWS D1.4/D1.4M.

1.4 DELIVERY AND STORAGE

Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

PART 2 PRODUCTS

2.1 DOWELS

Dowels shall conform to ASTM A 615/A 615M, Grade 60.

2.2 FABRICATED BAR MATS

Fabricated bar mats shall conform to ASTM A 184/A 184M.

2.3 REINFORCING STEEL

Reinforcing steel shall be deformed bars conforming to ASTM A 615/A 615M, Grade 60. Cold drawn wire used for spiral reinforcement shall conform to ASTM A 82/A 82M. In highly corrosive environments or when directed by the Contracting Officer, reinforcing steel shall conform to ASTM A 767/A 767M.

or ASTM A 775/A 775M as appropriate.

2.4 WELDED WIRE FABRIC

Welded wire fabric shall conform to ASTM A 185/A 185M or ASTM A 497/A 497M. When directed by the Contracting Officer for special applications, welded wire fabric shall conform to ASTM A 884/A 884M.

2.5 WIRE TIES

Wire ties shall be 16 gauge or heavier black annealed steel wire.

2.6 SUPPORTS

Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI 10MSP and shall be steel or precast concrete blocks. Precast concrete blocks shall have wire ties and shall be not less than 4 inches square when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding concrete. Where concrete formed surfaces will be exposed to weather or where surfaces are to be painted, steel supports within 1/2 inch of concrete surface shall be galvanized, plastic protected or of stainless steel. Concrete supports used in concrete exposed to view shall have the same color and texture as the finish surface. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.

PART 3 EXECUTION

3.1 REINFORCEMENT

Reinforcement shall be fabricated to shapes and dimensions shown and shall conform to the requirements of ACI 318/318R. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Bars shall not be bent after embedment in concrete. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety. Wire tie ends shall face away from the forms.

3.1.1 Placement

Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete. Reinforcement shall be placed in accordance with ACI 318/318R at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as indicated or as required by ACI 318/318R. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

3.1.2 Splicing

Splices of reinforcement shall conform to ACI 318/318R and shall be made only as required or indicated. Splicing shall be by lapping or by mechanical or welded butt connection; except that lap splices shall not be

used for bars larger than No. 11 unless otherwise indicated. Welding shall conform to AWS D1.4/D1.4M. Welded butt splices shall be full penetration butt welds. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than one-fifth the required length of lap or 6 inches. Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device. Butt splices shall develop 125 percent of the specified minimum yield tensile strength of the spliced bars or of the smaller bar in transition splices. Bars shall be flame dried before butt splicing. Adequate jigs and clamps or other devices shall be provided to support, align, and hold the longitudinal centerline of the bars to be butt spliced in a straight line.

3.2 WELDED-WIRE FABRIC PLACEMENT

Welded-wire fabric shall be placed in slabs as indicated. Fabric placed in slabs on grade shall be continuous between expansion, construction, and contraction joints. Fabric placement at joints shall be as indicated. Lap splices shall be made in such a way that the overlapped area equals the distance between the outermost crosswires plus 2 inches. Laps shall be staggered to avoid continuous laps in either direction. Fabric shall be wired or clipped together at laps at intervals not to exceed 4 feet. Fabric shall be positioned by the use of supports.

3.3 DOWEL INSTALLATION

Dowels shall be installed in slabs on grade at locations indicated and at right angles to joint being doweled. Dowels shall be accurately positioned and aligned parallel to the finished concrete surface before concrete placement. Dowels shall be rigidly supported during concrete placement. One end of dowels shall be coated with a bond breaker.

-- End of Section --

SECTION 03 31 00.00 10

CAST-IN-PLACE STRUCTURAL CONCRETE
11/09

PART 1 GENERAL

This specification refers to site infrastructure improvements only - Not Building or Building Foundations.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 117	(2006) Standard Specifications for Tolerances for Concrete Construction and Materials
ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 214R	(2002) Recommended Practice for Evaluation of Strength Test Results of Concrete
ACI 305R	(1999; Errata 2006) Hot Weather Concreting

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(2005) Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats
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ASTM INTERNATIONAL (ASTM)

ASTM C 1017/C 1017M	(2007) Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C 1059/C 1059M	(1999; R 2008) Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete
ASTM C 1064/C 1064M	(2008) Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C 1077	(2009b) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

ASTM C 1107/C 1107M	(2008) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C 1260	(2007) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C 136	(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 143/C 143M	(2009) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C 150	(2007) Standard Specification for Portland Cement
ASTM C 171	(2007) Standard Specification for Sheet Materials for Curing Concrete
ASTM C 172	(2008) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C 173/C 173M	(2009) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 231	(2009a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2006) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C 309	(2007) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 31/C 31M	(2009) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 33/C 33M	(2008) Standard Specification for Concrete Aggregates
ASTM C 39/C 39M	(2005e1e2) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C 494/C 494M	(2008a) Standard Specification for Chemical Admixtures for Concrete
ASTM C 595	(2008a) Standard Specification for Blended Hydraulic Cements
ASTM C 618	(2008a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C 78	(2009) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam

with Third-Point Loading)

ASTM C 881/C 881M	(2002) Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 94/C 94M	(2009) Standard Specification for Ready-Mixed Concrete
ASTM C 940	(1998a; R 2003) Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory
ASTM D 1751	(2004; R 2008) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(2004a; R 2008) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion
ASTM D 75/D 75M	(2009) Standard Practice for Sampling Aggregates

NATIONAL READY MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA QC 3	(2002) Quality Control Manual: Section 3, Plant Certifications Checklist: Certification of Ready Mixed Concrete Production Facilities
NRMCA TMMB 100	(2001) Truck Mixer, Agitator and Front Discharge Concrete Carrier Standards

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 104	(1980) Method of Calculation of the Fineness Modulus of Aggregate
COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete
COE CRD-C 521	(1981) Standard Test Method for Frequency and Amplitude of Vibrators for Concrete
COE CRD-C 540	(2001) Standard Specification for Nonbituminous Inserts for Contraction Joints in Portland Cement Concrete Airfield Pavements, Sawable Type
COE CRD-C 572	(1974) Specifications for Polyvinylchloride Waterstops

1.2 SYSTEM DESCRIPTION

Provide concrete composed of portland cement, other cementitious and

INDOOR AQUATICS CENTER - SITE INFRASTRUCTURE AND LANDSCAPE DESIGN

DP097

pozzolanic materials as specified, aggregates, water and admixtures as specified.

1.2.1 Tolerances

Except as otherwise specified herein, tolerances for concrete batching, mixture properties, and construction as well as definition of terms and application practices shall be in accordance with ACI 117. Take level and grade tolerance measurements of slabs as soon as possible after finishing; when forms or shoring are used, the measurements shall be made prior to removal.

1.2.2 Strength Requirements

Specified compressive strength (f'_c) shall be as follows:

COMPRESSIVE STRENGTH	STRUCTURE OR PORTION OF STRUCTURE
4000 psi at 28 days	All Project Concrete

Concrete slabs on-grade shall have a 28-day compressive strength of 4000 psi. Concrete made with high-early strength cement shall have a 7-day strength equal to the specified 28-day strength for concrete made with Type I or II portland cement. Compressive strength shall be determined in accordance with ASTM C 39/C 39M. Flexural strength shall be determined in accordance with ASTM C 78.

- a. Evaluation of Concrete Compressive Strength. Fabricate compressive strength specimens (6 by 12 inch cylinders), laboratory cure them in accordance with ASTM C 31/C 31M and test them in accordance with ASTM C 39/C 39M. The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equals or exceeds the specified compressive strength f'_c and no individual test result falls below the specified strength f'_c by more than 500 psi. A "test" is defined as the average of two companion cylinders, or if only one cylinder is tested, the results of the single cylinder test. Additional analysis or testing, including taking cores and/or load tests may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient.

1.2.3 Water-Cement Ratio

Maximum water-cement ratio (w/c) for normal weight concrete shall be as follows:

WATER-CEMENT RATIO, BY WEIGHT	STRUCTURE OR PORTION OF STRUCTURE
0.40	All Project Concrete

These w/c's may cause higher strengths than that required above for compressive or flexural strength. The maximum w/c required will be the equivalent w/c as determined by conversion from the weight ratio of water to cement plus pozzolan and silica fume by the weight equivalency method as

described in ACI 211.1. In the case where silica fume or GGBF slag is used, the weight of the silica fume slag shall be included in the equations of ACI 211.1 for the term P which is used to denote the weight of pozzolan.

1.2.4 Air Entrainment

Except as otherwise specified for lightweight concrete, all normal weight concrete shall be air entrained to contain between 4 and 7 percent total air, except that when the nominal maximum size coarse aggregate is 3/4 inch or smaller it shall be between 4.5 and 7.5 percent. Concrete with specified compressive strength over 5000 psi may have 1.0 percent less air than specified above. Specified air content shall be attained at point of placement into the forms. Air content for normal weight concrete shall be determined in accordance with ASTM C 231.

1.2.5 Slump

Slump of the concrete, as delivered to the point of placement into the forms, shall be within the following limits. Slump shall be determined in accordance with ASTM C 143/C 143M.

Structural Element	Slump	
	Minimum	Maximum
Foundation walls, substructure walls, footings, slabs	1 in.	3 in.
Any structural concrete approved for placement by pumping:		
At pump	2 in.	6 in.
At discharge of line	1 in.	4 in.

1.2.6 Concrete Temperature

The temperature of the concrete as delivered shall not exceed 90 degrees F. When the ambient temperature during placing is 40 degrees F or less, or is expected to be at any time within 6 hours after placing, the temperature of the concrete as delivered shall be between 55 and 75 degrees F.

1.2.7 Size of Coarse Aggregate

Use the largest feasible nominal maximum size aggregate (NMSA), specified in paragraph AGGREGATES PART 2, in each placement. However, nominal maximum size of aggregate shall not exceed any of the following: three-fourths of the minimum cover for reinforcing bars, three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in

accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Curing Materials
Joint fillers; (LEED)
Recycled Content Products; (LEED)
Portland Cement
Ready-Mixed Concrete
Waterstops
Chemical Admixtures
Epoxy-Resin

Manufacturer's product data, indicating VOC content.
Manufacturer's catalog data for the items above, including printed instructions. Products included in other referenced Section (Ex: 07 92 00 JOINT SEALANTS) shall follow the submittals requirements for that Section.

SD-06 Test Reports

Testing and Inspection for CQC; G

Certified copies of laboratory test reports, including mill tests and all other test data, for portland cement, blended cement, pozzolan, ground granulated blast furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use on this project.

SD-07 Certificates

Qualifications

Written documentation for Contractor Quality Control personnel.

SD-11 Closeout Submittals

Local/Regional Materials; (LEED)

LEED documentation relative to local/regional materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Cementitious Materials; (LEED)

Aggregate; (LEED)

LEED documentation relative to recycled content credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.4 QUALITY ASSURANCE

Submit qualifications for Contractor Quality Control personnel assigned to concrete construction as American Concrete Institute (ACI) Certified Workmen in one of the following grades or show written evidence of having completed similar qualification programs:

Concrete Field Testing Technician, Grade I

Concrete Laboratory Testing Technician, Grade I or II
Concrete Construction Inspector, Level II

Concrete Transportation Construction Inspector or Reinforced Concrete Special Inspector, Jointly certified by American Concrete Institute (ACI), Building Official and Code Administrators International (BOCA), International Code Council (ICC), and Southern Building Code Congress International (SBCCI).

The foreman or lead journeyman of the flatwork finishing crew shall have similar qualification for ACI Concrete Flatwork Technician/Finisher or equal, with written documentation.

1.4.1 Field Test Panels

Construct field test panels prior to beginning of work using the materials and procedures proposed for use on the job, to demonstrate the results to be attained. The quality and appearance of each panel shall be subject to the approval of the Contracting Officer, and, if not judged satisfactory, construct additional panels until approval is attained. Formed or finished surfaces in the completed structure shall match the quality and appearance of the approved field example.

1.4.2 Pre-installation Meeting

A pre-installation meeting with the Contracting Officer will be required at least 10 days prior to start of construction on Cast-in-Place Structural Concrete. The Contractor is responsible for calling the meeting; the Project Superintendent and active installation personnel shall be present.

1.4.3 Special Properties and Products

Concrete may contain admixtures other than air entraining agents, such as water reducers, superplasticizers, or set retarding agents to provide special properties to the concrete, if specified or approved. Any of these materials to be used on the project shall be used in the mix design studies.

1.4.4 Technical Service for Specialized Concrete

Obtain the services of a factory trained technical representative to oversee proportioning, batching, mixing, placing and consolidating. The technical representative shall be on the job full time until the Contracting Officer is satisfied that field controls indicate concrete of specified quality is furnished and that the Contractor's crews are capable of continued satisfactory work. The technical representative shall be available for consultation with, and advice to, Government forces.

1.4.5 Government Assurance Inspection and Testing

Day-to day inspection and testing shall be the responsibility of the Contractor Quality Control (CQC) staff. However, representatives of the Contracting Officer can and will inspect construction as considered appropriate and will monitor operations of the Contractor's CQC staff. Government inspection or testing will not relieve the Contractor of any CQC responsibilities.

1.4.5.1 Materials

The Government will sample and test aggregates, cementitious materials,

other materials, and concrete to determine compliance with the specifications as considered appropriate. Provide facilities and labor as may be necessary for procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with ASTM D 75/D 75M. Other materials will be sampled from storage at the jobsite or from other locations as considered appropriate. Samples may be placed in storage for later testing when appropriate.

1.4.5.2 Fresh Concrete

Fresh concrete will be sampled as delivered in accordance with ASTM C 172 and tested in accordance with these specifications, as considered necessary.

1.4.5.3 Hardened Concrete

Tests on hardened concrete will be performed by the Government when such tests are considered necessary.

1.4.5.4 Inspection

Concrete operations may be tested and inspected by the Government as the project progresses. Failure to detect defective work or material will not prevent rejection later when a defect is discovered nor will it obligate the Government for final acceptance.

1.5 DELIVERY, STORAGE, AND HANDLING

Store cement and other cementitious materials in weathertight buildings, bins, or silos which will exclude moisture and contaminants and keep each material completely separated. Aggregate stockpiles shall be arranged and used in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of aggregates. Aggregate shall not be stored directly on ground unless a sacrificial layer is left undisturbed. Store reinforcing bars and accessories above the ground on platforms, skids or other supports. Other materials shall be stored in such a manner as to avoid contamination and deterioration. Admixtures which have been in storage at the project site for longer than 6 months or which have been subjected to freezing shall not be used unless retested and proven to meet the specified requirements. Materials shall be capable of being accurately identified after bundles or containers are opened.

1.6 SUSTAINABLE DESIGN REQUIREMENTS

1.6.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources. Pavement materials may be locally available.

PART 2 PRODUCTS

In accordance with Section 01 62 35 RECYCLED / RECOVERED MATERIALS submit documentation indicating: distance between manufacturing facility and the project site, distance of raw material origin from the project site, percentage of post-industrial and post-consumer recycled content per unit of product and relative dollar value of recycled content products to total dollar value of products included in project. Submittals shall be as

specified in the subject Section.

2.1 CEMENTITIOUS MATERIALS

Cement and pozzolan will be accepted on the basis of manufacturer's certification of compliance, accompanied by mill test reports showing that the material in each shipment meets the requirements of the specification under which it is furnished. Mill test reports shall be no more than 1 month old, prior to use in the work. No cementitious material shall be used until notice of acceptance has been given by the Contracting Officer. Cementitious material may be subjected to check testing by the Government from samples obtained at the mill, at transfer points, or at the project site. If tests prove that a cementitious material that has been delivered is unsatisfactory, it shall be promptly removed from the site of the work. Cementitious material that has not been used within 6 months after testing shall be retested at the Contractor's expense and shall be rejected if test results are not satisfactory..

2.1.1 Cement

ASTM C 150, Type I or II or V or ASTM C 595, Type IS, IP, or P with maximum alkali content of 0.60%. Cement certificate shall include test results in accordance with ASTM C 150, including equivalent alkalies indicated in the Supplementary Optional Chemical Requirements.

2.1.2 Fly Ash and Pozzolan

ASTM C 618, Type F, except that the maximum allowable loss on ignition shall be 6%, maximum available alkalies content shall be 1.5%, and maximum calcium oxide (CaO) content 8%. Fly ash certificates shall include test results in accordance with ASTM C 618, including available alkalies indicated in the Supplementary Optional Chemical Requirements.

2.2 AGGREGATES

2.2.1 Alkali Reactivity Test

Aggregates to be used in all concrete shall be evaluated and tested by the Contractor for alkali-aggregate reactivity in accordance with ASTM C 1260. The types of aggregates shall be evaluated in a combination which matches the contractors' proposed mix design (including Class F fly ash), utilizing the modified version of ASTM C 1260. Test results of the combination shall have a measured expansion of less than 0.08 percent at 16 days. Should the test data indicate an expansion of greater than 0.08%, the aggregate(s) shall be rejected and the contractor shall submit new aggregate sources for retesting or may submit additional test results incorporating Lithium Nitrate for consideration.

ASTM C 1260 shall be modified as follows to include one of the following options:

- a. Utilize the contractor's proposed low alkali Portland cement and Class F fly ash in combination for the test proportioning. The laboratory shall use the contractor's proposed percentage of cement and fly ash.
- b. Utilize the contractor's proposed low alkali Portland cement and ground granulated blast furnace (GGBF) slag in combination for the test proportioning. The laboratory shall use the contractor's

proposed percentage of cement and GGBF.

- c. Utilize the contractor's proposed low alkali Portland cement and Class F fly ash and ground granulated blast furnace (GGBF) slag in combination for the test proportioning. The laboratory shall use the contractor's proposed percentage of cement, fly ash and GGBF.

2.2.2 Fine Aggregate

Fine aggregate shall conform to the quality and gradation requirements of ASTM C 33/C 33M.

2.2.3 Coarse Aggregate

Coarse aggregate shall conform to ASTM C 33/C 33M.

2.3 CHEMICAL ADMIXTURES

Chemical admixtures, when required or permitted, shall conform to the appropriate specification listed. Admixtures shall be furnished in liquid form and of suitable concentration for easy, accurate control of dispensing.

2.3.1 Air-Entraining Admixture

ASTM C 260 and shall consistently entrain the air content in the specified ranges under field conditions.

2.3.2 Accelerating Admixture

ASTM C 494/C 494M, Type C or E, except that calcium chloride or admixtures containing calcium chloride shall not be used.

2.3.3 Water-Reducing or Retarding Admixture

ASTM C 494/C 494M, Type A, B, or D, except that the 6-month and 1-year compressive and flexural strength tests are waived.

2.3.4 Other Chemical Admixtures

Chemical admixtures for use in producing flowing concrete shall comply with ASTM C 1017/C 1017M, Type I or II. These admixtures shall be used only when approved in writing, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

2.4 CURING MATERIALS

2.4.1 Impervious-Sheet

Impervious-sheet materials shall conform to ASTM C 171, type optional, except, that polyethylene sheet shall not be used.

2.4.2 Membrane-Forming Compound

Membrane-Forming curing compound shall conform to ASTM C 309, Type 2, class B, free of paraffin or petroleum.

2.4.3 Burlap and Cotton Mat

Burlap and cotton mat used for curing shall conform to AASHTO M 182.

2.5 WATER

Water for mixing and curing shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that non-potable water may be used if it meets the requirements of COE CRD-C 400.

2.6 NONSHRINK GROUT

Nonshrink grout shall conform to ASTM C 1107/C 1107M, and shall be a commercial formulation suitable for the proposed application.

2.7 LATEX BONDING AGENT

Latex agents for bonding fresh to hardened concrete shall conform to ASTM C 1059/C 1059M.

2.8 EPOXY RESIN

Epoxy resins for use in repairs shall conform to ASTM C 881/C 881M, Type V, Grade 2. Class as appropriate to the existing ambient and surface temperatures.

2.9 JOINT MATERIALS

2.9.1 Joint Fillers, Sealers, and Waterstops

Expansion joint fillers shall be preformed materials conforming to ASTM D 1751 and ASTM D 1752. Materials for and sealing of joints shall conform to the requirements of Section 32 01 19 FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS.

2.9.2 Contraction Joints in Slabs

Sawable type contraction joint inserts shall conform to COE CRD-C 540. Nonsawable joint inserts shall have sufficient stiffness to permit placement in plastic concrete without undue deviation from a straight line and shall conform to the physical requirements of COE CRD-C 540, with the exception of Section 3.4 "Resistance to Sawing". Plastic inserts shall be polyvinyl chloride conforming to the materials requirements of COE CRD-C 572.

PART 3 EXECUTION

3.1 PREPARATION FOR PLACING

Before commencing concrete placement, perform the following: Surfaces to receive concrete shall be clean and free from frost, ice, mud, and water. Forms shall be in place, cleaned, coated, and adequately supported. Reinforcing steel shall be in place, cleaned, tied, and adequately supported, in accordance with Section 03 20 01.00 10 CONCRETE REINFORCEMENT. Transporting and conveying equipment shall be in-place, ready for use, clean, and free of hardened concrete and foreign material. Equipment for consolidating concrete shall be at the placing site and in proper working order. Equipment and material for curing and for protecting concrete from weather or mechanical damage shall be at the placing site, in proper working condition and in sufficient amount for the entire

placement. When hot, windy conditions during concreting appear probable, equipment and material shall be at the placing site to provide windbreaks, shading, fogging, or other action to prevent plastic shrinkage cracking or other damaging drying of the concrete.

3.1.1 Foundations

3.1.1.1 Concrete on Earth Foundations

Earth (subgrade, base, or subbase courses) surfaces upon which concrete is to be placed shall be clean, damp, and free from debris, frost, ice, and standing or running water. Prior to placement of concrete, the foundation shall be well drained and shall be satisfactorily graded and uniformly compacted.

3.1.1.2 Preparation of Rock

Rock surfaces upon which concrete is to be placed shall be free from oil, standing or running water, ice, mud, drummy rock, coating, debris, and loose, semidetached or unsound fragments. Joints in rock shall be cleaned to a satisfactory depth, as determined by the Contracting Officer, and to firm rock on the sides. Immediately before the concrete is placed, rock surfaces shall be cleaned thoroughly by the use of air-water jets or sandblasting as specified below for Previously Placed Concrete. Keep rock surfaces continuously moist for at least 24 hours immediately prior to placing concrete thereon. All horizontal and approximately horizontal surfaces shall be covered, immediately before the concrete is placed, with a layer of mortar proportioned similar to that in the concrete mixture. Place concrete before the mortar stiffens.

3.1.2 Previously Placed Concrete

3.1.2.1 High-Pressure Water Jet

Use a stream of water under a pressure of not less than 3,000 psi for cutting and cleaning. Its use shall be delayed until the concrete is sufficiently hard so that only the surface skin or mortar is removed and there is no undercutting of coarse-aggregate particles. If the waterjet is incapable of a satisfactory cleaning, the surface shall be cleaned by sandblasting.

3.1.2.2 Wet Sandblasting

Use wet sandblasting after the concrete has reached sufficient strength to prevent undercutting of the coarse aggregate particles. After wet sandblasting, the surface of the concrete shall then be washed thoroughly to remove all loose materials.

3.1.2.3 Waste Disposal

The method used in disposing of waste water employed in cutting, washing, and rinsing of concrete surfaces shall be such that the waste water does not stain, discolor, or affect exposed surfaces of the structures, or damage the environment of the project area. The method of disposal shall be subject to approval.

3.1.2.4 Preparation of Previously Placed Concrete

Concrete surfaces to which other concrete is to be bonded shall be abraded in an approved manner that will expose sound aggregate uniformly without damaging the concrete. Remove laitance and loose particles. Surfaces shall be thoroughly washed and shall be moist but without free water when concrete is placed.

3.2 CONCRETE PRODUCTION

3.2.1 General Requirements

Concrete shall either be batched and mixed onsite or shall be furnished from a ready-mixed concrete plant. Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C 94/C 94M, except as otherwise specified. Truck mixers, agitators, and nonagitator transporting units shall comply with NRMCA TMMB 100. Ready-mix plant equipment and facilities shall be certified in accordance with NRMCA QC 3. Approved batch tickets shall be furnished for each load of ready-mixed concrete. Site-mixed concrete shall conform to the following subparagraphs.

3.2.2 Truck Mixers

Truck mixers, the mixing of concrete therein, and concrete uniformity shall conform to the requirements of ASTM C 94/C 94M. A truck mixer may be used either for complete mixing (transit-mixed) or to finish the partial mixing done in a stationary mixer (shrink-mixed). Each truck shall be equipped with two counters from which it is possible to determine the number of revolutions at mixing speed and the number of revolutions at agitating speed. Water shall not be added at the placing site unless specifically approved; and in no case shall it exceed the specified w/c. Any such water shall be injected at the base of the mixer, not at the discharge end.

3.3 CONVEYING CONCRETE ONSITE

3.3.1 Buckets

The interior hopper slope shall be not less than 58 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least 5 times the nominal maximum-size aggregate, and the area of the gate opening shall not be less than 2 square feet. The maximum dimension of the gate opening shall not be greater than twice the minimum dimension. The bucket gates shall be essentially grout tight when closed and may be manually, pneumatically, or hydraulically operated except that buckets larger than 2 cubic yards shall not be manually operated. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.

3.3.2 Transfer Hoppers

Concrete may be charged into nonagitator hoppers for transfer to other conveying devices. Transfer hoppers shall be capable of receiving concrete directly from delivery vehicles and shall have conical-shaped discharge features. Equip the transfer hopper with a hydraulically operated gate and with a means of external vibration to effect complete discharge. Concrete shall not be held in nonagitator transfer hoppers more than 30 minutes.

3.3.3 Trucks

Truck mixers operating at agitating speed or truck agitators used for transporting plant-mixed concrete shall conform to the requirements of ASTM C 94/C 94M. Use nonagitating equipment only for transporting plant-mixed concrete over a smooth road and when the hauling time is less than 15 minutes. Bodies of nonagitating equipment shall be smooth, watertight, metal containers specifically designed to transport concrete, shaped with rounded corners to minimize segregation, and equipped with gates that will permit positive control of the discharge of the concrete.

3.3.4 Chutes

When concrete can be placed directly from a truck mixer, agitator, or nonagitating equipment, the chutes normally attached to this equipment by the manufacturer may be used. Use a discharge deflector when required by the Contracting Officer. Separate chutes and other similar equipment will not be permitted for conveying concrete.

3.3.5 Belt Conveyors

Design and operate belt conveyors to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and provided with positive means, such as discharge baffle or hopper, for preventing segregation of the concrete at the transfer points and the point of placing. Construct belt conveyors such that the idler spacing does not exceed 36 inches. The belt speed shall be a minimum of 300 feet per minute and a maximum of 750 feet per minute. If concrete is to be placed through installed horizontal or sloping reinforcing bars, the conveyor shall discharge concrete into a pipe or elephant truck that is long enough to extend through the reinforcing bars.

3.3.6 Concrete Pumps

Concrete may be conveyed by positive displacement pump when approved. The pumping equipment shall be piston or squeeze pressure type; pneumatic placing equipment shall not be used. The pipeline shall be rigid steel pipe or heavy-duty flexible hose. The inside diameter of the pipe shall be at least 3 times the nominal maximum-size coarse aggregate in the concrete mixture to be pumped but not less than 4 inches. Aluminum pipe shall not be used.

3.4 PLACING CONCRETE

Discharge mixed concrete within 1.5 hours or before the mixer drum has revolved 300 revolutions, whichever comes first after the introduction of the mixing water to the cement and aggregates. When the concrete temperature exceeds 85 degrees F, reduce the time to 45 minutes. Place concrete within 15 minutes after it has been discharged from the transporting unit. Concrete shall be handled from mixer or transporting unit to forms in a continuous manner until the approved unit of operation is completed. Provide adequate scaffolding, ramps and walkways so that personnel and equipment are not supported by in-place reinforcement. Placing will not be permitted when the sun, heat, wind, or limitations of facilities prevent proper consolidation, finishing and curing. Provide sufficient placing capacity so that concrete can be kept free of cold joints.

3.4.1 Depositing Concrete

Deposit concrete as close as possible to its final position in the forms, and with no vertical drop greater than 5 feet except where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it will be effectively consolidated in horizontal layers not more than 12 inches thick, except that all slabs shall be placed in a single lift. Concrete to receive other construction shall be screeded to the proper level. Concrete shall be deposited continuously in one layer or in layers so that fresh concrete is deposited on in-place concrete that is still plastic. Fresh concrete shall not be deposited on concrete that has hardened sufficiently to cause formation of seams or planes of weakness within the section. Concrete that has surface dried, partially hardened, or contains foreign material shall not be used. When temporary spreaders are used in the forms, the spreaders shall be removed as their service becomes unnecessary. Concrete shall not be placed in slabs over columns and walls until concrete in columns and walls has been in-place at least two hours or until the concrete begins to lose its plasticity. Place concrete for beams, girders, brackets, column capitals, haunches, and drop panels at the same time as concrete for adjoining slabs.

3.4.2 Consolidation

Immediately after placing, consolidate each layer of concrete by internal vibrators, except for slabs 4 inches thick or less. The vibrators shall at all times be adequate in effectiveness and number to properly consolidate the concrete; keep a spare vibrator at the jobsite during all concrete placing operations. The vibrators shall have a frequency of not less than 10,000 vibrations per minute, an amplitude of at least 0.025 inch, and the head diameter shall be appropriate for the structural member and the concrete mixture being placed. Insert vibrators vertically at uniform spacing over the area of placement. The distance between insertions shall be approximately 1.5 times the radius of action of the vibrator so that the area being vibrated will overlap the adjacent just-vibrated area by a reasonable amount. The vibrator shall penetrate rapidly to the bottom of the layer and at least 6 inches into the preceding layer if there is such. Vibrator shall be held stationary until the concrete is consolidated and then vertically withdrawn slowly while operating. Form vibrators shall not be used unless specifically approved and unless forms are constructed to withstand their use. Vibrators shall not be used to move concrete within the forms. Slabs 4 inches and less in thickness shall be consolidated by properly designed vibrating screeds or other approved technique. Excessive vibration of lightweight concrete resulting in segregation or flotation of coarse aggregate shall be prevented. Frequency and amplitude of vibrators shall be determined in accordance with COE CRD-C 521. Grate tampers ("jitterbugs") shall not be used.

3.4.3 Cold Weather Requirements

Use special protection measures, approved by the Contracting Officer, if freezing temperatures are anticipated before the expiration of the specified curing period. The ambient temperature of the air where concrete is to be placed and the temperature of surfaces to receive concrete shall be not less than 40 degrees F. The temperature of the concrete when placed shall be not less than 50 degrees F nor more than 75 degrees F. Heating of the mixing water or aggregates will be required to regulate the concrete placing temperature. Materials entering the mixer shall be free from ice, snow, or frozen lumps. Salt, chemicals or other materials shall not be

incorporated in the concrete to prevent freezing. Upon written approval, an accelerating admixture conforming to ASTM C 494/C 494M, Type C or E may be used, provided it contains no calcium chloride. Calcium chloride shall not be used.

3.4.4 Hot Weather Requirements

When the ambient temperature during concrete placing is expected to exceed 85 degrees F, the concrete shall be placed and finished with procedures previously submitted and as specified herein. The concrete temperature at time of delivery to the forms shall not exceed the temperature shown in the table below when measured in accordance with ASTM C 1064/C 1064M. Cooling of the mixing water or aggregates or placing concrete in the cooler part of the day may be required to obtain an adequate placing temperature. A retarder may be used, as approved, to facilitate placing and finishing. Steel forms and reinforcements shall be cooled as approved prior to concrete placement when steel temperatures are greater than 120 degrees F. Conveying and placing equipment shall be cooled if necessary to maintain proper concrete-placing temperature.

Maximum Allowable Concrete Placing Temperature

Relative Humidity, Percent, During Time of Concrete Placement	Maximum Allowable Concrete Temperature Degrees
Greater than 60	90 F
40-60	85 F
Less than 40	80 F

3.4.5 Prevention of Plastic Shrinkage Cracking

During hot weather with low humidity, and particularly with appreciable wind, as well as interior placements when space heaters produce low humidity, the Contractor shall be alert to the tendency for plastic shrinkage cracks to develop and shall institute measures to prevent this. Take particular care if plastic shrinkage cracking is potentially imminent and especially if it has developed during a previous placement. Periods of high potential for plastic shrinkage cracking can be anticipated by use of Fig. 2.1.5 of ACI 305R. In addition the concrete placement shall be further protected by erecting shades and windbreaks and by applying fog sprays of water, sprinkling, ponding or wet covering. Plastic shrinkage cracks that occur shall be filled by injection of epoxy resin as directed, after the concrete hardens. Plastic shrinkage cracks shall never be troweled over or filled with slurry.

3.5 JOINTS

Locate and construct joints as indicated or approved. Joints not indicated on the drawings shall be located and constructed to minimize the impact on the strength of the structure. Joints shall be perpendicular to the main reinforcement. All reinforcement shall be continued across joints; except that reinforcement or other fixed metal items shall not be continuous through expansion joints, or through construction or contraction joints in slabs on grade. Reinforcement shall be 2 inches clear from each joint. The perimeters of the slabs shall be free of fins, rough edges, spalling, or other unsightly appearance. Reservoir for sealant for construction and contraction joints in slabs shall be formed to the dimensions shown on the drawings by removing snap-out joint-forming inserts, by sawing sawable

inserts, or by sawing to widen the top portion of sawed joints. Joints to be sealed shall be cleaned and sealed as indicated and in accordance with Section 32 01 19 FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS.

3.5.1 Construction Joints

For concrete other than slabs on grade, locate construction joints so that the unit of operation does not exceed 20 feet. Concrete shall be placed continuously so that each unit is monolithic in construction. Fresh concrete shall not be placed against adjacent hardened concrete until it is at least 24 hours old. Locate construction joints as indicated or approved. Where concrete work is interrupted by weather, end of work shift or other similar type of delay, location and type of construction joint shall be subject to approval of the Contracting Officer. Unless otherwise indicated and except for slabs on grade, extend reinforcing steel through construction joints. Construction joints in slabs on grade shall be keyed or doweled as shown. Prior to placing additional concrete, horizontal construction joints shall be prepared as specified in paragraph Previously Placed Concrete above.

3.5.2 Contraction Joints in Slabs on Grade

Contraction joints shall be located and detailed as shown on the drawings. Produce contraction joints by forming a weakened plane in the concrete slab by or sawing a continuous slot with a concrete saw. The joint shall be as indicated in the drawings. For saw-cut joints, cutting shall be timed properly with the set of the concrete. Cutting shall be started as soon as the concrete has hardened sufficiently to prevent ravelling of the edges of the saw cut. Cutting shall be completed before shrinkage stresses become sufficient to produce cracking. Form reservoir for joint sealant as previously specified.

3.5.3 Expansion Joints

Installation of expansion joints and sealing of these joints shall conform to the requirements of Section 32 01 19 FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS.

3.5.4 Dowels and Tie Bars

Install dowels and tie bars at the locations shown on the drawings and to the details shown, using materials and procedures specified in Section 03 20 01.00 10 CONCRETE REINFORCEMENT and herein. Conventional smooth "paving" dowels shall be installed in slabs using approved methods to hold the dowel in place during concreting within a maximum alignment tolerance of 1/8 inch in 12 inches. "Structural" type deformed bar dowels, or tie bars, shall be installed to meet the specified tolerances. Care shall be taken during placing adjacent to and around dowels and tie bars to ensure there is no displacement of the dowel or tie bar and that the concrete completely embeds the dowel or tie bar and is thoroughly consolidated.

3.6 FINISHING FORMED SURFACES

Finishing of formed surfaces shall be as specified herein. Unless another type of architectural or special finish is specified, surfaces shall be left with the texture imparted by the forms except that defective surfaces shall be repaired. Unless painting of surfaces is required, maintain uniform color of the concrete by use of only one mixture without changes in materials or proportions for any structure or portion of structure that

requires a Class A or B finish. Except for major defects, as defined hereinafter, repair surface defects as specified herein within 24 hours after forms are removed. Repairs of the so-called "plaster-type" will not be permitted in any location. Tolerances of formed surfaces shall conform to the requirements of ACI 117. These tolerances apply to the finished concrete surface, not to the forms themselves; forms shall be set true to line and grade. Form tie holes requiring repair and other defects whose depth is at least as great as their surface diameter shall be repaired as specified in paragraph Damp-Pack Mortar Repair below. Defects whose surface diameter is greater than their depth shall be repaired as specified in paragraph Repair of Major Defects below. Repairs shall be finished flush with adjacent surfaces and with the same surface texture. The cement used for all repairs shall be a blend of job cement with white cement proportioned so that the final color after curing and aging will be the same as the adjacent concrete. Concrete with excessive honeycomb, or other defects which affect the strength of the member, will be rejected. Repairs shall be demonstrated to be acceptable and free from cracks or loose or drummy areas at the completion of the contract and, for Class A and B Finishes, shall be inconspicuous. Repairs not meeting these requirements will be rejected and shall be replaced.

3.7 REPAIRS

3.7.1 Damp-Pack Mortar Repair

Form tie holes requiring repair and other defects, whose depth is at least as great as their surface diameter but not over 4 inches, shall be repaired by the damp-pack mortar method. Form tie holes shall be reamed and other similar defects shall be cut out to sound concrete. The void shall then be thoroughly cleaned, thoroughly wetted, brush-coated with a thin coat of neat cement grout and filled with mortar. Mortar shall be a stiff mix of 1 part portland cement to 2 parts fine aggregate passing the No. 16 mesh sieve, and minimum amount of water. Use only sufficient water to produce a mortar which, when used, will stick together on being molded into a ball by a slight pressure of the hands and will not exude water but will leave the hands damp. Mortar shall be mixed and allowed to stand for 30 to 45 minutes before use with remixing performed immediately prior to use. Mortar shall be thoroughly tamped in place in thin layers using a hammer and hardwood block. All holes shall be packed full. Damp-pack repairs shall be moist cured for at least 48 hours.

3.7.2 Repair of Major Defects

Major defects will be considered to be those more than 1/2 inch deep. Also included are any defects of any kind whose depth is over 4 inches or whose surface diameter is greater than their depth. Repair major defects as specified below.

3.7.2.1 Surface Application of Mortar Repair

Defective concrete shall be removed, and removal shall extend into completely sound concrete. Use approved equipment and procedures which will not cause cracking or microcracking of the sound concrete. If reinforcement is encountered, remove concrete so as to expose the reinforcement for at least 2 inches on all sides. All such defective areas greater than 12 square inches shall be outlined by saw cuts at least 1 inch deep. Defective areas less than 12 square inches shall be outlined by a 1 inch deep cut with a core drill in lieu of sawing. All saw cuts shall be straight lines in a rectangular pattern in line with the formwork panels.

After concrete removal, the surface shall be thoroughly cleaned by high pressure washing to remove all loose material. Keep surfaces continually saturated for the first 12 of the 24 hours immediately before placing mortar and shall be damp but not wet at the time of commencing mortar placement. The Contractor, as an option, may use either hand-placed mortar or mortar placed with a mortar gun. If hand-placed mortar is used, the edges of the cut shall be perpendicular to the surface of the concrete. The prepared area shall be brush-coated with a thin coat of neat cement grout. The repair shall then be made using a stiff mortar, preshrunk by allowing the mixed mortar to stand for 30 to 45 minutes and then remixed, thoroughly tamped into place in thin layers. If hand-placed mortar is used, test each repair area for drumminess by firm tapping with a hammer and inspecting for cracks, both in the presence of the Contracting Officer, immediately before completion of the contract, and replacing any showing drumminess or cracking. If mortar placed with a mortar gun is used, the gun shall be a small compressed air-operated gun to which the mortar is slowly hand fed and which applies the mortar to the surface as a high-pressure stream, as approved. Repairs made using shotcrete equipment will not be accepted. The mortar used shall be the same mortar as specified for damp-pack mortar repair. If gun-placed mortar is used, the edges of the cut shall be beveled toward the center at a slope of 1:1. All surface applied mortar repairs shall be continuously moist cured for at least 7 days. Moist curing shall consist of several layers of saturated burlap applied to the surface immediately after placement is complete and covered with polyethylene sheeting, all held closely in place by a sheet of plywood or similar material rigidly braced against it. Keep burlap continually wet.

3.7.2.2 Repair of Deep and Large Defects

Deep and large defects will be those that are more than 6 inches deep and also have an average diameter at the surface more than 18 inches or that are otherwise so identified by the Project Office. Such defects shall be repaired as specified herein or directed, except that defects which affect the strength of the structure shall not be repaired and that portion of the structure shall be completely removed and replaced. Repair deep and large defects by procedures approved in advance including forming and placing special concrete using applied pressure during hardening. Preparation of the repair area shall be as specified for surface application of mortar. In addition, the top edge (surface) of the repair area shall be sloped at approximately 20 degrees from the horizontal, upward toward the side from which concrete will be placed. The special concrete shall be a concrete mixture with low water content and low slump, and shall be allowed to age 30 to 60 minutes before use. Concrete containing a specified expanding admixture may be used in lieu of the above mixture; design the paste portion of such concrete mixture to have an expansion between 2.0 and 4.0 percent when tested in accordance with ASTM C 940. Provide a full width "chimney" at the top of the form on the placing side to ensure filling to the top of the opening. Use a pressure cap on the concrete in the chimney with simultaneous tightening and revibrating the form during hardening to ensure a tight fit for the repair. Remove the form after 24 hours and immediately the chimney shall be carefully chipped away to avoid breaking concrete out of the repair; the surface of the repair concrete shall be dressed as required.

3.8 EXTERIOR SLAB AND RELATED ITEMS

3.8.1 Pavements

Construct pavements where shown on the drawings. After forms are set and underlying material prepared as specified, place the concrete uniformly throughout the area and thoroughly vibrated. As soon as placed and vibrated, the concrete shall be struck off and screeded to the crown and cross section and to such elevation above grade that when consolidated and finished, the surface of the pavement will be at the required elevation. The entire surface shall be tamped with the strike off, or consolidated with a vibrating screed, and this operation continued until the required compaction and reduction of internal and surface voids are accomplished. Take care to prevent bringing excess paste to the surface. Immediately following the final consolidation of the surface, the pavement shall be floated longitudinally from bridges resting on the side forms and spanning but not touching the concrete. If necessary, additional concrete shall be placed and screeded, and the float operated until a satisfactory surface has been produced. The floating operation shall be advanced not more than half the length of the float and then continued over the new and previously floated surfaces. After finishing is completed but while the concrete is still plastic, eliminate minor irregularities and score marks in the pavement surface by means of long-handled cutting straightedges. Straightedges shall be 12 feet in length and shall be operated from the sides of the pavement and from bridges. A straightedge operated from the side of the pavement shall be equipped with a handle 3 feet longer than one-half the width of the pavement. The surface shall then be tested for trueness with a 12 foot straightedge held in successive positions parallel and at right angles to the center line of the pavement, and the whole area covered as necessary to detect variations. The straightedge shall be advanced along the pavement in successive stages of not more than one-half the length of the straightedge. Depressions shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished. Projections above the required elevation shall also be struck off and refinished. Continue the straightedge testing and finishing until the entire surface of the concrete is true. Before the surface sheen has disappeared and well before the concrete becomes nonplastic, the surface of the pavement shall be given a nonslip sandy surface texture by use of a burlap drag. A strip of clean, wet burlap from 3 to 5 feet wide and 2 feet longer than the pavement width shall be carefully pulled across the surface. Round edges and joints with an edger having a radius of 1/8 inch. Curing shall be as specified.

3.8.2 Sidewalks

Concrete shall be 4 inches minimum thickness. Provide contraction joints at 5 feet spaces unless otherwise indicated. Contraction joints shall be cut 1 inch deep with a jointing tool after the surface has been finished. Provide transverse expansion joints 1/2 inch thick at changes in direction and where sidewalk abuts curbs, steps, rigid pavement, or other similar structures. Sidewalks shall be given a lightly broomed finish. A transverse slope of 1/4 inch per foot shall be provided, unless otherwise indicated. Variations in cross section shall be limited to 1/4 inch in 5 feet.

3.8.3 Curbs and Gutters

Concrete shall be formed, placed, and finished by hand using a properly shaped "mule" or constructed using a slipform machine specially designed

for this work. Curbs will be poured integral with the adjacent concrete pavement. Contraction joints shall be cut 3 inches deep with a jointing tool after the surface has been finished. Expansion joints (3/4 inch wide) shall be provided at 600 feet maximum spacing unless otherwise indicated. Finish exposed surfaces using a stiff bristled brush.

3.9 CURING AND PROTECTION

3.9.1 General

Concrete shall be cured by an approved method for the period of time given below:

Concrete with Type III cement	3 days
All other concrete	7 days

Immediately after placement, protect concrete from premature drying, extremes in temperatures, rapid temperature change, mechanical injury and damage from rain and flowing water for the duration of the curing period. Maintain air and forms in contact with concrete at a temperature above 50 degrees F for the first 3 days and at a temperature above 32 degrees F for the remainder of the specified curing period. Exhaust fumes from combustion heating units shall be vented to the outside of the enclosure, and heaters and ducts shall be placed and directed so as not to cause areas of overheating and drying of concrete surfaces or to create fire hazards. Materials and equipment needed for adequate curing and protection shall be available and at the site prior to placing concrete. No fire or excessive heat, including welding, shall be permitted near or in direct contact with the concrete at any time. Except as otherwise permitted by paragraph Membrane Forming Curing Compounds in PART 2, moist curing shall be provided for any areas to receive floor hardener, any paint or other applied coating, or to which other concrete is to be bonded. Concrete containing silica fume shall be initially cured by fog misting during finishing, followed immediately by continuous moist curing. Except for plastic coated burlap, impervious sheeting alone shall not be used for curing.

3.9.2 Moist Curing

Maintain concrete, to be moist-cured, continuously wet for the entire curing period, commencing immediately after finishing. If water or curing materials used stain or discolor concrete surfaces which are to be permanently exposed, the concrete surfaces shall be cleaned as approved. When wooden forms are left in place during curing, they shall be kept wet at all times. If steel forms are used in hot weather, non-supporting vertical forms shall be broken loose from the concrete soon after the concrete hardens and curing water continually applied in this void. If the forms are removed before the end of the curing period, curing shall be carried out as on unformed surfaces, using suitable materials. Surfaces shall be cured by ponding, by continuous sprinkling, by continuously saturated burlap or cotton mats, or by continuously saturated plastic coated burlap. Burlap and mats shall be clean and free from any contamination and shall be completely saturated before being placed on the concrete. Provide an approved work system to ensure that moist curing is continuous 24 hours per day.

3.9.3 Membrane Forming Curing Compounds

Concrete in the following areas may be cured with a pigmented curing compound in lieu of moist curing. Membrane curing shall not be used on

surfaces that are to receive any subsequent treatment depending on adhesion or bonding to the concrete, including surfaces to which a smooth finish is to be applied or other concrete to be bonded. However, a styrene acrylate or chlorinated rubber compound meeting ASTM C 309, Class B requirements, may be used for surfaces which are to be painted or are to receive bituminous roofing or waterproofing, or floors that are to receive adhesive applications of resilient flooring. The curing compound selected shall be compatible with any subsequent paint, roofing, waterproofing or flooring specified. Membrane curing compound shall not be used on surfaces that are maintained at curing temperatures with free steam. Apply curing compound to formed surfaces immediately after the forms are removed and prior to any patching or other surface treatment except the cleaning of loose sand, mortar, and debris from the surface. All surfaces shall be thoroughly moistened with water. Curing compound shall be applied to slab surfaces as soon as the bleeding water has disappeared, with the tops of joints being temporarily sealed to prevent entry of the compound and to prevent moisture loss during the curing period. The curing compound shall be applied in a two-coat continuous operation by approved motorized power-spraying equipment operating at a minimum pressure of 75 psi, at a uniform coverage of not more than 400 square feet/gallon for each coat, and the second coat shall be applied perpendicular to the first coat. Concrete surfaces which have been subjected to rainfall within 3 hours after curing compound has been applied shall be resprayed by the method and at the coverage specified. Shade surfaces, on which clear compound is used, from direct rays of the sun for the first 3 days. Keep surfaces coated with curing compound free of foot and vehicular traffic, and from other sources of abrasion and contamination during the curing period.

3.9.4 Cold Weather Curing and Protection

When the daily ambient low temperature is less than 32 degrees F maintain the temperature of the concrete above 40 degrees F for the first seven days after placing. During the period of protection removal, control the air temperature adjacent to the concrete surfaces so that concrete near the surface will not be subjected to a temperature differential of more than 25 degrees F as determined by suitable temperature measuring devices furnished by the Contractor, as required, and installed adjacent to the concrete surface and 2 inches inside the surface of the concrete. Perform the installation of the thermometers as directed.

3.10 TESTING AND INSPECTION FOR CQC

Perform the inspection and tests described below and, based upon the results of these inspections and tests, take the action required and submit specified reports. When, in the opinion of the Contracting Officer, the concreting operation is out of control, cease concrete placement and correct the operation. The laboratory performing the tests shall be onsite and shall conform with ASTM C 1077. Materials may be subjected to check testing by the Government from samples obtained at the manufacturer, at transfer points, or at the project site. The Government will inspect the laboratory, equipment, and test procedures prior to start of concreting operations and at least once per 60 days thereafter for conformance with ASTM C 1077.

3.10.1 Grading and Corrective Action

3.10.1.1 Fine Aggregate

At least once during each shift when the concrete plant is operating, there

shall be one sieve analysis and fineness modulus determination in accordance with ASTM C 136 and COE CRD-C 104 for the fine aggregate or for each fine aggregate if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. When the amount passing on any sieve is outside the specification limits, the fine aggregate shall be immediately resampled and retested. If there is another failure on any sieve, the fact shall be immediately reported to the Contracting Officer, concreting shall be stopped, and immediate steps taken to correct the grading.

3.10.1.2 Coarse Aggregate

At least once during each shift in which the concrete plant is operating, there shall be a sieve analysis in accordance with ASTM C 136 for each size of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor shall be responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken at the same locations shall show the results of the current test as well as the average results of the five most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than as delivered to the mixer to allow for degradation during handling. When the amount passing any sieve is outside the specification limits, the coarse aggregate shall be immediately resampled and retested. If the second sample fails on any sieve, that fact shall be reported to the Contracting Officer. Where two consecutive averages of 5 tests are outside specification limits, the operation shall be considered out of control and reported to the Contracting Officer. Concreting shall be stopped and immediate steps shall be taken to correct the grading.

3.10.2 Quality of Aggregates

Thirty days prior to the start of concrete placement, perform all tests for aggregate quality required by ASTM C 33/C 33M. In addition, after the start of concrete placement, perform tests for aggregate quality at least every three months, and when the source of aggregate or aggregate quality changes. Samples tested after the start of concrete placement shall be taken immediately prior to entering the concrete mixer.

3.10.3 Scales, Batching and Recording

Check the accuracy of the scales by test weights prior to start of concrete operations and at least once every three months. Such tests shall also be made as directed whenever there are variations in properties of the fresh concrete that could result from batching errors. Once a week the accuracy of each batching and recording device shall be checked during a weighing operation by noting and recording the required weight, recorded weight, and the actual weight batched. At the same time, test and ensure that the devices for dispensing admixtures are operating properly and accurately. When either the weighing accuracy or batching accuracy does not comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made. Discrepancies in recording accuracies shall be corrected immediately.

3.10.4 Batch-Plant Control

Continuously control the measurement of concrete materials, including cementitious materials, each size of aggregate, water, and admixtures. Adjust the aggregate weights and amount of added water as necessary to compensate for free moisture in the aggregates. The amount of air-entraining agent shall be adjusted to control air content within specified limits. Prepare a report indicating type and source of cement used, type and source of pozzolan or slag used, amount and source of admixtures used, aggregate source, the required aggregate and water weights per cubic yard amount of water as free moisture in each size of aggregate, and the batch aggregate and water weights per cubic yard for each class of concrete batched during each day's plant operation.

3.10.5 Concrete Mixture

- a. Air Content Testing. Perform air content tests when test specimens are fabricated. In addition, at least two tests for air content shall be made on randomly selected batches of each separate concrete mixture produced during each 8-hour period of concrete production. Perform additional tests when excessive variation in workability is reported by the placing foreman or Government inspector. Tests shall be made in accordance with ASTM C 231 for normal weight concrete and ASTM C 173/C 173M for lightweight concrete. Plot test results on control charts which shall at all times be readily available to the Government and submitted weekly. Keep copies of the current control charts in the field by testing crews and results plotted as tests are made. When a single test result reaches either the upper or lower action limit, perform a second test immediately. The results of the two tests shall be averaged and this average used as the air content of the batch to plot on both the air content and the control chart for range, and for determining need for any remedial action. The result of each test, or average as noted in the previous sentence, shall be plotted on a separate control chart for each mixture on which an "average line" is set at the midpoint of the specified air content range from paragraph Air Entrainment in PART 1. Set an upper warning limit and a lower warning limit line 1.0 percentage point above and below the average line, respectively. An upper action limit and a lower action limit line shall be set 1.5 percentage points above and below the average line, respectively. The range between each two consecutive tests shall be plotted on a secondary control chart for range where an upper warning limit is set at 2.0 percentage points and an upper action limit is set at 3.0 percentage points. Samples for air content may be taken at the mixer, however, the Contractor is responsible for delivering the concrete to the placement site at the stipulated air content. If the Contractor's materials or transportation methods cause air content loss between the mixer and the placement, correlation samples shall be taken at the placement site as required by the Contracting Officer, and the air content at the mixer controlled as directed.
- b. Air Content Corrective Action. Whenever points on the control chart for percent air reach either warning limit, an adjustment shall immediately be made in the amount of air-entraining admixture batched. As soon as practical after each adjustment, another test shall be made to verify the result of the adjustment. Whenever a point on the secondary control chart for

range reaches the warning limit, the admixture dispenser shall be recalibrated to ensure that it is operating accurately and with good reproducibility. Whenever a point on either control chart reaches an action limit line, the air content shall be considered out of control and the concreting operation shall immediately be halted until the air content is under control. Additional air content tests shall be made when concreting is restarted.

- c. Slump Testing. In addition to slump tests which are made when test specimens are fabricated, at least four slump tests shall be made on randomly selected batches in accordance with ASTM C 143/C 143M for each separate concrete mixture produced during each 8-hour or less period of concrete production each day. Also, additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government inspector. Plot test results on control charts which shall at all times be readily available to the Government and submitted weekly. Keep copies of the current control charts in the field by testing crews and results plotted as tests are made. When a single slump test reaches or goes beyond either the upper or lower action limit, immediately perform a second test. The results of the two tests shall be averaged and this average used as the slump of the batch to plot on both the control charts for slump and the chart for range, and for determining need for any remedial action. Set limits on separate control charts for slump for each type of mixture. The upper warning limit shall be set at 1/2 inch below the maximum allowable slump specified in paragraph Slump in PART 1 for each type of concrete and an upper action limit line and lower action limit line shall be set at the maximum and minimum allowable slumps, respectively, as specified in the same paragraph. The range between each consecutive slump test for each type of mixture shall be plotted on a single control chart for range on which an upper action limit is set at 2 inches. Take samples for slump at the mixer. However, the Contractor is responsible for delivering the concrete to the placement site at the stipulated slump. If the Contractor's materials or transportation methods cause slump loss between the mixer and the placement, take correlation samples at the placement site as required by the Contracting Officer, and the slump at the mixer controlled as directed.
- d. Slump Corrective Action. Whenever points on the control charts for slump reach the upper warning limit, make an adjustment immediately in the batch weights of water and fine aggregate. The adjustments are to be made so that the total water content does not exceed that amount allowed by the maximum w/c ratio specified, based on aggregates which are in a saturated surface dry condition. When a single slump reaches the upper or lower action limit, no further concrete shall be delivered to the placing site until proper adjustments have been made. Immediately after each adjustment, another test shall be made to verify the correctness of the adjustment. Whenever two consecutive individual slump tests, made during a period when there was no adjustment of batch weights, produce a point on the control chart for range at or above the upper action limit, halt the concreting operation immediately, and take appropriate steps to bring the slump under control. Additional slump tests shall be made as directed.
- e. Temperature. Measure the temperature of the concrete when

compressive strength specimens are fabricated in accordance with ASTM C 1064/C 1064M. Report the temperature along with the compressive strength data.

- f. Strength Specimens. Perform at least one set of test specimens, for compressive or flexural strength as appropriate, on each different concrete mixture placed during the day for each 500 cubic yards or portion thereof of that concrete mixture placed each day. Perform additional sets of test specimens, as directed by the Contracting Officer, when the mixture proportions are changed or when low strengths have been detected. Develop a truly random (not haphazard) sampling plan for approval by the Contracting Officer prior to the start of construction. The plan shall ensure that sampling is done in a completely random and unbiased manner. A set of test specimens for concrete with a 28-day specified strength in accordance with paragraph Strength Requirements in PART 1 shall consist of four specimens, two to be tested at 7 days and two at 28 days. Test specimens shall be molded and cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39/C 39M for test cylinders and ASTM C 78 for test beams. Results of all strength tests shall be reported immediately to the Contracting Officer. Quality control charts shall be kept for individual strength "tests", ("test" as defined in paragraph Strength Requirements in PART 1) moving average of last 3 "tests" for strength, and moving average for range for the last 3 "tests" for each mixture. The charts shall be similar to those found in ACI 214R.

3.10.6 Inspection Before Placing

Inspect foundations, construction joints, forms, and embedded items in sufficient time prior to each concrete placement in order to certify to the Contracting Officer that they are ready to receive concrete. Report the results of each inspection in writing.

3.10.7 Placing

The placing foreman shall supervise placing operations, shall determine that the correct quality of concrete or grout is placed in each location as specified and as directed by the Contracting Officer, and shall be responsible for measuring and recording concrete temperatures and ambient temperature hourly during placing operations, weather conditions, time of placement, volume placed, and method of placement. The placing foreman shall not permit batching and placing to begin until it has been verified that an adequate number of vibrators in working order and with competent operators are available. Placing shall not be continued if any pile of concrete is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, immediate steps shall be taken to improve temperature controls.

3.10.8 Vibrators

Determine the frequency and amplitude of each vibrator in accordance with COE CRD-C 521 prior to initial use and at least once a month when concrete is being placed. Perform additional tests as directed when a vibrator does not appear to be adequately consolidating the concrete. The frequency shall be determined while the vibrator is operating in concrete with the tachometer being held against the upper end of the vibrator head while almost submerged and just before the vibrator is withdrawn from the

concrete. Determine the amplitude with the head vibrating in air. Take two measurements, one near the tip and another near the upper end of the vibrator head, and these results averaged. Report the make, model, type, and size of the vibrator and frequency and amplitude results in writing. Any vibrator not meeting the requirements of paragraph Consolidation above, shall be immediately removed from service and repaired or replaced.

3.10.9 Curing Inspection

- a. Moist Curing Inspections. At least once each shift, and not less than twice per day on both work and non-work days, an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be noted and recorded.
- b. Moist Curing Corrective Action. When a daily inspection report lists an area of inadequate curing, immediate corrective action shall be taken, and the required curing period for those areas shall be extended by 1 day.
- c. Membrane Curing Inspection. No curing compound shall be applied until the Contractor has verified that the compound is properly mixed and ready for spraying. At the end of each operation, estimate the quantity of compound used by measurement of the container and the area of concrete surface covered, compute the rate of coverage in square feet/gallon, and note whether or not coverage is uniform.
- d. Membrane Curing Corrective Action. When the coverage rate of the curing compound is less than that specified or when the coverage is not uniform, the entire surface shall be sprayed again.
- e. Sheet Curing Inspection. At least once each shift and once per day on non-work days, an inspection shall be made of all areas being cured using impervious sheets. The condition of the covering and the tightness of the laps and tapes shall be noted and recorded.
- f. Sheet Curing Corrective Action. When a daily inspection report lists any tears, holes, or laps or joints that are not completely closed, the tears and holes shall promptly be repaired or the sheets replaced, the joints closed, and the required curing period for those areas shall be extended by 1 day.

3.10.10 Cold-Weather Protection

At least once each shift and once per day on non-work days, an inspection shall be made of all areas subject to cold-weather protection. Any deficiencies shall be noted, corrected, and reported.

3.10.11 Mixer Uniformity

- a. Stationary Mixers. Prior to the start of concrete placing and once every 6 months when concrete is being placed, or once for every 75,000 cubic yards of concrete placed, whichever results in the shortest time interval, uniformity of concrete mixing shall be determined in accordance with ASTM C 94/C 94M.
- b. Truck Mixers. Prior to the start of concrete placing and at least once every 6 months when concrete is being placed, uniformity of

concrete mixing shall be determined in accordance with ASTM C 94/C 94M. Select the truck mixers randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of the blades may be regarded as satisfactory.

- c. Mixer Uniformity Corrective Action. When a mixer fails to meet mixer uniformity requirements, either the mixing time shall be increased, batching sequence changed, batch size reduced, or adjustments shall be made to the mixer until compliance is achieved.

3.10.12 Reports

Report all results of tests or inspections conducted, informally as they are completed and in writing daily. Prepare a weekly report for the updating of control charts covering the entire period from the start of the construction season through the current week. During periods of cold-weather protection, reports of pertinent temperatures shall be made daily. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Such reports of failures and the action taken shall be confirmed in writing in the routine reports. The Contracting Officer has the right to examine all contractor quality control records.

-- End of Section --

SECTION 03 40 00.00 10

PLANT-PRECAST CONCRETE PRODUCTS FOR BELOW GRADE CONSTRUCTION
08/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 211.2	(1998; R 2004) Standard Practice for Selecting Proportions for Structural Lightweight Concrete
ACI 305R	(1999; Errata 2006) Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting
ACI 318/318R	(2005) Building Code Requirements for Structural Concrete and Commentary

AMERICAN CONCRETE PIPE ASSOCIATION (ACPA)

ACPA 01-102	(2000) Concrete Pipe Handbook
ACPA 01-110	(1984) Design Manual for Sulfide and Corrosion Prediction and Control
ACPA QPC	(2005; Ver 3.0) QCast Plant Certification Manual

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2008; Errata 2009) Structural Welding Code - Steel
AWS D1.4/D1.4M	(2005; Errata 2005) Structural Welding Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 153/A 153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 185/A 185M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for

	Concrete
ASTM A 36/A 36M	(2008) Standard Specification for Carbon Structural Steel
ASTM A 496/A 496M	(2007) Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement
ASTM A 497/A 497M	(2006; R 2006) Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete
ASTM A 615/A 615M	(2009) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A 706/A 706M	(2006a) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 82/A 82M	(2007) Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
ASTM C 1064/C 1064M	(2008) Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C 1107/C 1107M	(2008) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C 1240	(2005) Standard Specification for Silica Fume Used in Cementitious Mixtures
ASTM C 1244	(2005a; E 2006) Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill
ASTM C 138/C 138M	(2007) Standard Test Method for Density ("Unit Weight"), Yield, and Air Content (Gravimetric) of Concrete
ASTM C 143/C 143M	(2009) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C 1478	(2007) Standard Specification for Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes and Laterals
ASTM C 150	(2007) Standard Specification for Portland Cement
ASTM C 171	(2007) Standard Specification for Sheet Materials for Curing Concrete
ASTM C 173/C 173M	(2009) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

ASTM C 192/C 192M	(2006) Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 231	(2009a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2006) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C 309	(2007) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 31/C 31M	(2009) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(2003) Standard Specification for Concrete Aggregates
ASTM C 330	(2005) Standard Specification for Lightweight Aggregates for Structural Concrete
ASTM C 39/C 39M	(2005e1e2) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C 443	(2005ae1) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C 494/C 494M	(2008a) Standard Specification for Chemical Admixtures for Concrete
ASTM C 595	(2008a) Standard Specification for Blended Hydraulic Cements
ASTM C 618	(2008a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C 877	(2008) External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections
ASTM C 891	(1990; R 2003) Installation of Underground Precast Concrete Utility Structures
ASTM C 920	(2008) Standard Specification for Elastomeric Joint Sealants
ASTM C 923	(2002) Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
ASTM C 989	(2006) Standard Specification for Ground

Granulated Blast-Furnace Slag for Use in
Concrete and Mortars

ASTM C 990

(2006) Standard Specification for Joints
for Concrete Pipe, Manholes and Precast
Box Sections Using Preformed Flexible
Joint Sealants

CSA AMERICA, INC. (CSA/AM)

CAN/CSA A23.4

(2005) Precast Concrete - Materials and
Construction

NATIONAL PRECAST CONCRETE ASSOCIATION (NPCA)

NPCA QC Manual

(2005; R 2006) Quality Control Manual for
Precast Plants

1.2 SUBMITTALS

All submittals are the responsibility of the precast concrete producer. Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Quality Control Procedures

Quality control procedures established by the precast manufacturer in accordance with NPCA QC Manual and/or ACPA QPC.

SD-02 Shop Drawings

Standard Precast Units; G

Drawings for standard precast concrete units furnished by the precast concrete producer for approval by the Contracting Officer. These drawings shall demonstrate that the applicable industry design standards have been met. Include installation and construction information on shop drawings. Include details of steel reinforcement size and placement as well as supporting design calculations, if appropriate. Produce precast concrete units in accordance with the approved drawings.

Custom-Made Precast Units; G

Drawings for custom-made precast concrete units furnished by the precast concrete producer for approval by the Contracting Officer. Show on these drawings complete design, installation, and construction information in such detail as to enable the Contracting Officer to determine the adequacy of the proposed units for the intended purpose. Include details of steel reinforcement size and placement as well as supporting design calculations, if appropriate. Produce precast concrete units in accordance with the approved drawings.

SD-03 Product Data

Standard Precast Units

Cut sheets, for standard precast concrete units, showing conformance to project drawings and requirements, and to applicable industry design standards listed in this specification.

Proprietary Precast Units

Standard plans or informative literature, for proprietary precast concrete units. Make available supporting calculations and design details upon request. Provide sufficient information as to demonstrate that such products will perform the intended task.

Embedded Items

Product data sheets and proper installation instruction for anchors, lifting inserts and other devices. Clearly indicate the products dimensions and safe working load.

Accessories

Proper installation instructions and relevant product data for items including, but not limited to, sealants, gaskets, connectors, steps, cable racks and other items installed before or after delivery.

SD-05 Design Data

Design Calculations Concrete Mix Proportions

Precast concrete unit design calculations, and concrete mix proportions.

SD-06 Test Reports

Test Reports

a. Copies of material certifications and/or laboratory test reports, including mill tests and all other test data, for portland cement, blended cement, pozzolans, ground granulated blast furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use on this project.

b. Copies of test reports showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the job conditions. Such tests may include compressive strength, flexural strength, plastic or hardened air content, freeze thaw durability, abrasion and absorption. Clearly detail in the specifications special tests for precast concrete or cast-in items.

c. Copies of in-plant QA/QC inspection reports, upon the request of the Contracting Officer.

SD-07 Certificates

Quality Control Procedures

Quality control procedures established in accordance with
NPCA QC Manual and/or ACPA QPC.

1.3 GENERAL REQUIREMENTS

Furnish precast concrete units designed and fabricated by an experienced and acceptable precast concrete manufacturer who has been, for at least 3 years, regularly and continuously engaged in the manufacture of precast concrete work similar to that indicated on the drawings. Coordinate precast work with the work of other trades.

1.4 DESIGN

1.4.1 Standard Precast Units

Design standard precast concrete units to withstand indicated design load conditions in accordance with applicable industry design standards ACI 318/318R, ASTM, ACPA 01-102, Chapter 7-Design for Sulfide Control. Design must also consider stresses induced during handling, shipping and installation as to avoid product cracking or other handling damage. Indicate design loads for precast concrete units on the shop drawings.

1.4.2 Custom-Made Precast Units

Submit design calculations and drawings of custom-made precast units, prepared and sealed by a registered professional engineer, for approval prior to fabrication. Include in the calculations the analysis of units for lifting stresses and the sizing of lifting devices.

1.4.3 Proprietary Precast Units

Products manufactured under franchise arrangements must conform to all the requirements specified by the franchiser. Items not included in the franchise specification, but included in this specification, must conform to the requirements in this specification.

1.4.4 Joints and Sealants

Provide joints and sealants between adjacent units of the type and configuration indicated on shop drawings meeting specified design and performance requirements.

1.4.5 Concrete Mix Design

1.4.5.1 Concrete Mix Proportions

Base selection of proportions for concrete on the methodology presented in ACI 211.1 for normal weight concrete and ACI 211.2 for lightweight concrete. Develop the concrete proportions using the same type and brand of cement, the same type and brand of pozzolan, the same type and gradation of aggregates, and the same type and brand of admixture that will be used in the manufacture of precast concrete units for the project. Do not use calcium chloride in precast concrete containing reinforcing steel or other embedded metal items. At a minimum of thirty days prior to precast concrete unit manufacturing, the precast concrete producer will submit a mix design for each strength and type of concrete that will be used. Furnish a complete list of materials, including quantity, type, brand and

applicable data sheets for all mix design constituents as well as applicable reference specifications. The use of self-consolidating concrete is permitted, provided that mix design proportions and constituents meet the requirements of this specification.

1.4.5.2 Concrete Strength

Provide precast concrete units with a 28-day compressive strength (f'c) of 4000 psi.

1.4.5.3 Water-to-Cement Ratio

Furnish concrete, that will be exposed to freezing and thawing, containing entrained air and with water-cement ratios of 0.45 or less. Furnish concrete which will not be exposed to freezing, but which is required to be watertight, with a water-cement ratio of 0.48 or less if the concrete is exposed to fresh water, or 0.45 or less if exposed to brackish water or sea water. Furnish reinforced concrete exposed to deicer salts, brackish water or seawater with a water-cement ratio of 0.40 or less for corrosion protection.

1.4.5.4 Air Content

The air content of concrete that will be exposed to freezing conditions must be within the limits given below.

NOMINAL MAXIMUM AGGREGATE SIZE	AIR CONTENT %	
	SEVERE EXPOSURE	MODERATE EXPOSURE
10 mm (3/8 inch)	6.0 to 9.0	4.5 to 7.5
13 mm (1/2 inch)	5.5 to 8.5	4.0 to 7.0
19 mm (3/4 inch)	4.5 to 7.5	3.5 to 6.5
25 mm (1.0 inch)	4.5 to 7.5	3.0 to 6.0
38 mm (1.5 inch)	4.5 to 7.0	3.0 to 6.0

Note: For specified compressive strengths greater than 5000 psi, air content may be reduced 1%

1.4.5.5 Corrosion Control for Sanitary Sewer Systems

Follow design recommendations outlined in Chapter 7 of ACPA 01-102 or the ACPA 01-110 when hydrogen sulfide is indicated as a potential problem.

1.5 QUALITY ASSURANCE

Demonstrate adherence to the standards set forth in NPCA QC Manual and/or ACPA QPC. Meet requirements written in the subparagraphs below.

1.5.1 NPCA and ACPA Plant Certification

The precast concrete producer shall be certified by the National Precast Concrete Association's and/or the American Concrete Pipe Association's Plant Certification Program prior to and during production of the products for this project.

1.5.2 Qualifications, Quality Control and Inspection

1.5.2.1 Qualifications

Select a precast concrete producer that has been in the business of producing precast concrete units similar to those specified for a minimum of 3 years. The precast concrete producer must maintain a permanent quality control department or retain an independent testing agency on a continuing basis.

1.5.2.2 Quality Control Procedures

Show that the following QC tests are performed as required and in accordance with the ASTM standards indicated.

- a. Slump: Perform a slump test for each 150 cu yd of concrete produced, or once a day, whichever comes first. Perform slump tests in accordance with ASTM C 143/C 143M.
- b. Temperature: Measure the temperature of fresh concrete when slump or air content tests are made and when compressive test specimens are made in accordance with ASTM C 1064/C 1064M.
- c. Compressive Strength: Make at least four compressive strength specimens for each 150 cubic yards of concrete of each mix in accordance with the following Standards: ASTM C 31/C 31M, ASTM C 192/C 192M, ASTM C 39/C 39M.
- d. Air Content: Perform tests for air content on air-entrained, wet-cast concrete for each 150 cu yd of concrete, but not less often than once each day when air-entrained concrete is used. Determine the air content in accordance with either ASTM C 231 or ASTM C 173/C 173M for normal weight aggregates and ASTM C 173/C 173M for lightweight aggregates.
- e. Unit Weight: Perform tests for unit weight a minimum of once per week to verify the yield of batch mixes. Perform unit weight tests for each 100 cu yd of lightweight concrete in accordance with ASTM C 138/C 138M.

Submit test reports as specified in the Submittals paragraph and documentation to demonstrate compliance with the above subparagraphs.

1.5.2.3 Inspection

The Contracting Officer may place an inspector in the plant when the units covered by this specification are being manufactured. The burden of payment for plant inspection will be clearly detailed in the specification. The precast concrete producer shall give notice 14 days prior to the time the units will be available for plant inspection. Neither the exercise nor waiver of inspection at the plant will affect the Government's right to enforce contractual provisions after units are transported or erected.

1.6 HANDLING, STORAGE AND DELIVERY

1.6.1 Handling

Handle, transport, and store products in a manner to minimize damage.

Lifting devices or holes shall be consistent with industry standards. Perform lifting with methods or devices intended for this purpose as indicated on shop drawings.

1.6.2 Storage

Store units off the ground or in a manner that will minimize potential damage.

1.6.3 Delivery

Deliver precast units to the site in accordance with the delivery schedule to avoid excessive build-up of units in storage at the site. Upon delivery to the jobsite, all precast concrete units will be inspected by the Contracting Officer for quality and final acceptance.

PART 2 PRODUCTS

2.1 MATERIALS

Except as otherwise specified in the following paragraphs, conform material to Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE and Section 03 20 01.00 10 CONCRETE REINFORCEMENT.

2.1.1 Cement

Furnish cement conforming to ASTM C 150, Type I, II, III or V. Sanitary Sewer applications shall utilize Type V only. Furnish blended cements that conform to ASTM C 595.

2.1.2 Silica Fume

Provide silica fume conforming to ASTM C 1240. Provide available alkalies conforming to the optimal limit given in Table 2 of ASTM C 1240. Silica fume may be furnished as a dry, densified material or as a slurry. When necessary, coordinate the services of a technical representative experienced in mixing, proportioning, placement procedures, and curing of concrete containing silica fume.

2.1.3 Fly Ash and Pozzolans

Fly ash is if used as an admixture conforming to ASTM C 618, Class F with 4 percent maximum loss on ignition and 35 percent maximum cement replacement by weight.

2.1.4 Ground Granulated Blast-Furnace Slag

Ground granulated blast furnace slag if used as an admixture conforming to ASTM C 989, Grade 120 with between 25 to 50 percent maximum cement replacement by weight.

2.1.5 Water

Furnish water potable or free of deleterious substances in amounts harmful to concrete or embedded metals.

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2.1.1.6 Aggregates

2.1.1.6.1 Selection

Furnish aggregates conforming to ASTM C 33. Provide aggregates not containing any substance, which may be deleteriously reactive with the alkalis in the cement.

2.1.1.6.2 Aggregates for Lightweight Concrete

ASTM C 330

2.1.1.7 Admixtures

2.1.1.7.1 Air-Entraining

ASTM C 260

2.1.1.7.2 Accelerating, Retarding, Water Reducing Moderate to High

ASTM C 494/C 494M

2.1.1.7.3 Pigments

Non-fading and lime-resistant

2.1.1.8 Reinforcement

2.1.1.8.1 Reinforcing Bars

- a. Deformed Billet-steel: ASTM A 615/A 615M
- b. Deformed Low-alloy steel: ASTM A 706/A 706M

2.1.1.8.2 Reinforcing Wire

- a. Plain Wire: ASTM A 82/A 82M
- b. Deformed Wire: ASTM A 496/A 496M

2.1.1.8.3 Welded Wire Fabric

- a. Plain Wire: ASTM A 185/A 185M
- b. Deformed Wire: ASTM A 497/A 497M

2.1.1.9 Inserts and Embedded Metal

All items embedded in concrete shall be of the type required for the intended task, and meet the following standards.

- a. Structural Steel Plates, Angles, etc.: ASTM A 36/A 36M
- b. Hot-dipped Galvanized: ASTM A 153/A 153M
- c. Proprietary Items: In accordance with manufacturers published literature

2.1.1.10 Accessories

- a. Rubber Gaskets for Circular Concrete Sewer Pipe and Culvert Pipe: ASTM C 443.
- b. External Sealing Bands for Noncircular Sewer, Storm Drain and

Culvert Pipe: ASTM C 877.

c. Preformed Flexible Joint Sealants for Concrete Pipe, Manholes, and Manufactured Box Sections: ASTM C 990.

d. Elastomeric Joint Sealants: ASTM C 920

2.1.11 Pipe Entry Connectors

Pipe entry connectors shall conform to ASTM C 923 or ASTM C 1478.

2.1.12 Grout

Nonshrink Grout shall conform to ASTM C 1107/C 1107M. Cementitious grout shall be a mixture of portland cement, sand, and water. Proportion one part cement to approximately 2.5 parts sand, with the amount of water based on placement method. Provide air entrainment for grout exposed to the weather.

PART 3 EXECUTION

3.1 FABRICATION AND PLACEMENT

Perform fabrication in accordance with NPCA QC Manual and/or ACPA QPC unless specified otherwise.

3.1.1 Forms

Use forms, for manufacturing precast concrete products, of the type and design consistent with industry standards and practices. They should be capable of consistently providing uniform products and dimensions. Construct forms so that the forces and vibrations to which the forms will be subjected can cause no product damage. Clean forms of concrete build-up after each use. Apply form release agents according to the manufacturers recommendations and do not allow to build up on the form casting surfaces.

3.1.2 Reinforcement

Follow applicable ASTM Standard or ACI 318/318R for placement and splicing. Fabricate cages of reinforcement either by tying the bars, wires or welded wire fabric into rigid assemblies or by welding, where permissible, in accordance with AWS D1.4/D1.4M. Position reinforcing as specified by the design and so that the concrete cover conforms to requirements. The tolerance on concrete cover shall be one-third of that specified but not more than 1/2 inch. Provide concrete cover not less than 1/2 inch. Take positive means to assure that the reinforcement does not move significantly during the casting operations.

3.1.3 Embedded Items

Position embedded items at locations specified in the design documents. Perform welding in accordance with AWS D1.1/D1.1M when necessary. Hold rigidly in place inserts, plates, weldments, lifting devices and other items to be imbedded in precast concrete products so that they do not move significantly during casting operations.

3.2 CONCRETE

3.2.1 Concrete Mixing

Mixing operations shall produce batch-to-batch uniformity of strength, consistency, and appearance.

3.2.2 Concrete Placing

Deposit concrete into forms as near to its final location as practical. Keep the free fall of the concrete to a minimum. Consolidate concrete in such a manner that segregation of the concrete is minimized and honeycombed areas are kept to a minimum. Use vibrators to consolidate concrete with frequencies and amplitudes sufficient to produce well consolidated concrete.

3.2.2.1 Cold Weather Concreting

Perform cold weather concreting in accordance with ACI 306.1.

- a. Provide adequate equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather.
- b. Free from frost all concrete materials and all reinforcement, forms, fillers, and ground with which concrete is to come in contact.
- c. Do not use frozen materials or materials containing ice.
- d. In cold weather the temperature of concrete at the time of placing shall not be below 45 degrees F. Discard concrete that freezes before its compressive strength reaches 500 psi.

3.2.2.2 Hot Weather Concreting

Recommendations for hot weather concreting are given in detail in ACI 305R. During hot weather, give proper attention to constituents, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures or water evaporation that could impair required strength or serviceability of the member or structure. The temperature of concrete at the time of placing shall not exceed 90 degrees F.

3.2.3 Concrete Curing

Commence curing immediately following the initial set and completion of surface finishing.

3.2.3.1 Curing by Moisture Retention

Prevent moisture evaporation from exposed surfaces until adequate strength for stripping is reached by one of the following methods:

- a. Cover with polyethylene sheets a minimum of 6 mils thick per ASTM C 171.
- b. Cover with burlap or other absorptive material and keep continually moist.
- c. Use of a membrane-curing compound applied at a rate not to exceed 200 square ft/gallon, or per manufacturers' recommendations according to ASTM C 309.

3.2.3.2 Curing with Heat and Moisture

Do not subject concrete to steam or hot air until after the concrete has attained its initial set. Apply steam, if used, within a suitable enclosure, which permits free circulation of the steam in accordance with CAN/CSA A23.4. If hot air is used for curing, take precautions to prevent moisture loss from the concrete. The temperature of the concrete shall not be permitted to exceed 150 degrees F. These requirements do not apply to products cured with steam under pressure in an autoclave.

3.2.4 Surface Finish

Finish unformed surfaces of wet-cast precast concrete products as specified. If no finishing procedure is specified, finish such surfaces using a strike-off to level the concrete with the top of the form.

3.2.4.1 Formed Non-Architectural Surfaces

Cast surfaces against approved forms following industry practices in cleaning forms, designing concrete mixes, placing and curing concrete. Normal color variations, form joint marks, small surface holes caused by air bubbles, and minor chips and spalls will be accepted but no major imperfections, honeycombs or other major defects will be permitted.

3.2.4.2 Unformed Surfaces

Finish unformed surfaces with a vibrating screed, or by hand with a float. Normal color variations, minor indentations, minor chips and spalls will be accepted but no major imperfections, honeycombs, or other major defects shall be permitted.

3.2.4.3 Special Finishes

Troweled, broom or other finishes shall be according to the requirements of project documents and performed per industry standards or supplier specifications. Submit finishes for approval when required by the project documents. The sample finishes shall be approved prior to the start of production.

3.2.5 Stripping Products from Forms

Do not remove products from the forms until the concrete reaches the compressive strength for stripping required by the design. If no such requirement exists, products may be removed from the forms after the final set of concrete provided that stripping damage is minimal.

3.2.6 Patching and Repair

No repair is required to formed surfaces that are relatively free of air voids and honeycombed areas, unless the surfaces are required by the design to be finished.

3.2.6.1 Repairing Minor Defects

Defects that will not impair the functional use or expected life of a precast concrete product may be repaired by any method that does not impair the product.

3.2.6.2 Repairing Honeycombed Areas

When honeycombed areas are to be repaired, remove all loose material and cut back the areas into essentially horizontal or vertical planes to a depth at which coarse aggregate particles break under chipping rather than being dislodged. Use proprietary repair materials in accordance with the manufacturer's instructions. If a proprietary repair material is not used, saturate the area with water. Immediately prior to repair, the area should be damp, but free of excess water. Apply a cement-sand grout or an approved bonding agent to the chipped surfaces, followed immediately by consolidating an appropriate repair material into the cavity.

3.2.6.3 Repairing Major Defects

Evaluate, by qualified personnel, defects in precast concrete products which impair the functional use or the expected life of products to determine if repairs are feasible and, if so, to establish the repair procedure.

3.2.7 Shipping Products

Do not ship products until they are at least 5 days old, unless it can be shown that the concrete strength has reached at least 75% of the specified 28-day strength, or that damage will not result, impairing the performance of the product.

3.3 INSTALLATION

3.3.1 Site Access

It is the Contractor's responsibility to provide adequate access to the site to facilitate hauling, storage and proper handling of the precast concrete products.

3.3.2 General Requirements

- a. Install precast concrete products to the lines and grades shown in the contract documents or otherwise specified.
- b. Lift products by suitable lifting devices at points provided by the precast concrete producer.
- c. Install products per the precast concrete producer's instructions. In the absence of such instructions, install underground utility structures in accordance with ASTM C 891. Install pipe and manhole sections in accordance with the procedures outlined by the American Concrete Pipe Association.
- d. Field modifications to the product will relieve the precast producer of liability even if such modifications result in the failure of the product.

3.3.3 Water Tightness

Where water tightness is a necessary performance characteristic of the precast concrete product's end use, watertight joints, connectors and inserts should be used to ensure the integrity of the entire system.

3.4 FIELD QUALITY CONTROL

3.4.1 Site Tests

When water tightness testing is required for an underground product, use one of the following methods:

3.4.2 Vacuum Testing

Prior to backfill vacuum test system according to ASTM C 1244.

3.4.3 Water Testing

Perform water testing according to the contract documents and precast concrete producer's recommendations.

-- End of Section --

SECTION 12 93 00

SITE FURNISHINGS

02/09

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 303 (2005) Code of Standard Practice for Steel Buildings and Bridges

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.3 (2006) Operations - Safety Requirements for Powder Actuated Fastening Systems

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2008; Errata 2009) Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

ASME B18.2.1 (1996; Addenda A 1999; Errata 2003; R 2005) Square and Hex Bolts and Screws (Inch Series)

ASME B18.2.2 (1987; R 2005) Standard for Square and Hex Nuts

ASME B18.21.1 (1999; R 2005) Lock Washers (Inch Series)

ASME B18.22.1 (1965; R 2008) Plain Washers

ASME B18.6.2 (1998; R 2005) Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws: Inch Series

ASME B18.6.3 (2003; R 2008) Machine Screws and Machine Screw Nuts

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M (2009) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A 153/A 153M (2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A 185/A 185M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A 307	(2007b) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 36/A 36M	(2008) Standard Specification for Carbon Structural Steel
ASTM A 47/A 47M	(1999; R 2009) Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
ASTM A 48/A 48M	(2003; R 2008) Standard Specification for Gray Iron Castings
ASTM A 500/A 500M	(2007) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 501	(2007) Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A 53/A 53M	(2007) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 615/A 615M	(2009) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A 653/A 653M	(2009) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 780/A 780M	(2001; R 2006) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM B 108/B 108M	(2008) Standard Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B 209	(2007) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(2008) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 26/B 26M	(2009) Standard Specification for Aluminum-Alloy Sand Castings
ASTM B 62	(2009) Standard Specification for

	Composition Bronze or Ounce Metal Castings
ASTM C 150/C 150M	(2009) Standard Specification for Portland Cement
ASTM C 94/C 94M	(2009) Standard Specification for Ready-Mixed Concrete
ASTM D 1187	(1997; R 2002e1) Asphalt-Base Emulsions for Use as Protective Coatings for Metal
ASTM D 2990	(2009) Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
ASTM D 3451	(2006) Testing Coating Powders and Powder Coatings
ASTM D 648	(2007) Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
ASTM E 488	(1996; R 2003) Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 25	(1997; E 2004) Paint Specification No. 25 Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel Type I and Type II
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U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS A-A-1925	(Rev A; Notice 1) Shield, Expansion (Nail Anchors)
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1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Benches; G
Assembly Instruction Drawings
Trash Receptacles; G

Drawings showing scaled details of proposed site furnishings, elevations for each type of site furnishing; dimensions, details, and methods of mounting or anchoring; shape and thickness of materials; and details of construction.

SD-03 Product Data

Benches

Bicycle Racks
Trash Receptacles

Manufacturer's descriptive data and catalog cuts.

SD-04 Samples

Finish; G

Two sets of color data for each furnishing displaying manufacturer's color selections and finishes, and identifying those colors and finishes proposed for use.

SD-06 Test Reports

Recycled Materials

A report of site furnishing parts consisting of recycled materials. Product specification data, providing test information for deflection and creep in accordance with ASTM D 648 and ASTM D 2990 for site furnishings which use plastic lumber as a component, shall be submitted. The data shall provide a comparison of deflection and creep measurements to other comparable materials.

Testing

A report of post-installation test results.

SD-07 Certificates

Primer certificate
Powder coatings certificate

Manufacturer's certificate of compliance.

1.3 QUALITY ASSURANCE

Qualify welders in accordance with AWS D1.1/D1.1M using procedures, materials, and equipment of the type required for the work.

1.3.1 Fabrication Drawings

Submit fabrication drawings showing layout(s), connections to structural system, and anchoring details as specified in AISC 303.

1.3.2 Installation Drawings

Submit templates, erection and installation drawings indicating thickness, type, grade, class of metal, and dimensions. Show construction details, reinforcement, anchorage, and installation.

1.3.3 Assembly Instruction Drawings

Submit assembly instruction drawings showing layout(s), connections, bolting and anchoring details in accordance with manufacturer's standards.

1.3.4 Primer Certificate

Submit a certificate from the manufacturer stating that the primer conforms to requirements of SSPC Paint 25.

1.3.5 Powder Coatings Certificate

Submit a certificate from the manufacturer stating that the powder coat conforms to ASTM D 3451.

1.4 DELIVERY, STORAGE, AND HANDLING

Ship items knocked-down (KD) ready for site assembly. Packaged components shall be complete including all accessories and hardware. Materials shall be delivered, handled, and stored in accordance with the manufacturer's recommendations. Site furnishings shall be inspected upon arrival at the job site for conformity to specifications and quality in accordance with paragraph MATERIALS. Protect from corrosion, staining, and other types of damage. Store items in designated area free from contact with soil and weather. Remove and replace damaged items with new items.

PART 2 PRODUCTS

2.1 MATERIALS

Provide materials which are the standard products of a manufacturer regularly engaged in the manufacture of such products. The materials provided shall be of a type with proven satisfactory usage for at least 2 years.

2.1.1 Metals

Furnish metal components with factory drilled holes and free of excess weld and spatter. Metal components with holes that will not be filled by hardware or hidden by other components will be rejected. Structural steel products shall conform to ASTM A 36/A 36M, ASTM A 500/A 500M and ASTM A 501.

2.1.2 Structural Tubing

ASTM A 500/A 500M.

2.1.3 Steel Pipe and Fittings

Steel pipe shall conform to ASTM A 53/A 53M, Type E or S, Grade B; standard malleable iron fittings shall conform to ASTM A 47/A 47M.

2.1.4 Gray Cast Iron

Gray cast iron shall conform to ASTM A 48/A 48M Class 35 or better. Provide castings manufactured true to pattern and component parts that fit together in a satisfactory manner. Castings shall be of uniform quality, free from blowholes, porosity, hard spots, shrinkage, distortion, or other defects. Smooth castings shall be well-cleaned by sand or shot blasting.

2.1.5 Cast Aluminum

Cast aluminum shall conform to ASTM B 26/B 26M and ASTM B 108/B 108M. Provide castings manufactured true to pattern and component parts that fit together in a satisfactory manner. Provide castings of uniform quality,

free from blowholes, porosity, hard spots, shrinkage, distortion, or other defects. Smooth castings shall be well-cleaned by sand or shot blasting.

2.1.6 Aluminum Alloy Products

Conform to ASTM B 209 for sheet plate, ASTM B 221 for extrusions and ASTM B 26/B 26M or ASTM B 108/B 108M for castings, as applicable. Provide aluminum extrusions at least 1/8 inch thick and aluminum plate or sheet at least 0.050 inch thick.

2.1.7 Anchors and Hardware

Provide anchors, where necessary, for fastening site furnishings securely in place and in accordance with approved manufacturer's instructions. Anchoring devices that may be used, when no anchors are otherwise specified or indicated, include anchor bolts, slotted inserts, expansion shields for concrete; toggle bolts and through bolts for masonry; machine carriage bolts for steel; and lag bolts and screws for wood. Anchor bolts shall conform to ASTM A 307. Hardware shall be galvanized steel in accordance with ASTM A 153/A 153M and compatible with the material to which applied. All exposed hardware shall match in color and finish. Mounting hardware shall be concealed, recessed, and plugged.

2.1.7.1 Threaded Inserts and Expansion Anchors

Provide inserts recessed not less than 2.5 inches into concrete or masonry. Pullout 198 pounds in concrete with f'c of 3,000 psi, as tested in accordance with ASTM E 488. Expansion shields shall conform to FS A-A-1925, group II, type 4, class 1. Provide embedment required by manufacturer.

2.1.7.2 Lag Screws and Bolts

ASME B18.2.1, type and grade best suited for the purpose.

2.1.7.3 Toggle Bolts

ASME B18.2.1.

2.1.7.4 Bolts, Nuts, Studs and Rivets

ASME B18.2.2 or ASTM A 307.

2.1.7.5 Power Driven Fasteners

Follow safety provisions of ASSE/SAFE A10.3.

2.1.7.6 Screws

ASME B18.2.1, ASME B18.6.2, and ASME B18.6.3.

2.1.7.7 Washers

Provide plain washers to conform to ASME B18.22.1. Provide beveled washers for American Standard beams and channels, square or rectangular, tapered in thickness, and smooth. Provide lock washers to conform to ASME B18.21.1.

INDOOR AQUATICS CENTER - SITE INFRASTRUCTURE AND LANDSCAPE DESIGN

DP097

2.1.1.8 Ounce Metals

Bronze, copper, and other ounce metals shall conform to ASTM B 62.

2.1.1.9 Concrete

Ready-mixed concrete shall conform to ASTM C 94/C 94M, using 3/4 inch maximum size aggregate, and having minimum compressive strength of 4000 psi at 28 days. Portland cement shall conform to ASTM C 150/C 150M. Reinforcing steel shall conform to ASTM A 615/A 615M. Welded wire fabric shall conform to ASTM A 185/A 185M.

2.1.1.10 Plastics

Recycled materials shall contain a minimum 85 percent recycled post-consumer product and shall conform to EPA requirements. Recycled materials shall be constructed or manufactured with a maximum 1/4 inch deflection or creep in any member in conformance with ASTM D 648 and ASTM D 2990. Provide panels and components molded of ultraviolet (UV) and color stabilized polyethylene, with minimum 1/4 inch wall thickness; exposed edges shall be smoothed, rounded, and free of burrs and points; and the material shall be resistant to fading, cracking, fogging, and shattering. The material shall be non-toxic and have no discernible contaminants such as paper, foil, or wood. The material shall contain no more than 3 percent air voids. Material shall be resistant to deformation from solar radiation heat gain. Recycled materials to include plastic lumber will not be used as structural components of site furnishings.

2.2 PRETREATMENT, PRIMING AND PAINTING

Apply pretreatment, primer, and paint in accordance with manufacturer's printed instructions. On surfaces concealed in the finished construction or not accessible for finish painting, apply an additional prime coat to a minimum dry film thickness of 1.0 mil.

2.2.1 Nonferrous Metal Surfaces

Protect by plating, anodic, or organic coatings.

2.2.2 Aluminum Surfaces

Before finishes are applied, remove roll marks, scratches, rolled-in scratches, kinks, stains, pits, orange peel, die marks, structural streaks, and other defects which will affect uniform appearance of finished surfaces.

2.3 COATINGS AND FINISHES

2.3.1 Galvanizing

Hot-dip galvanize items specified to be zinc-coated, after fabrication where practicable. Galvanizing shall conform to ASTM A 123/A 123M, ASTM A 153/A 153M or ASTM A 653/A 653M, as applicable. Tailings and sharp protrusions formed as a result of the hot-dip process shall be removed and exposed edges burnished. Galvanize anchor bolts, grating fasteners, washers and parts or devices necessary for proper installation, unless otherwise indicated.

2.3.2 Polyester Powder

Powder-coated surfaces shall receive electrostatic zinc coating prior to painting. Powder coating shall be electrostatically applied and oven cured. Polyester powder coating shall be resistant to ultraviolet (UV) light.

2.3.3 Polyvinyl-Chloride (PVC)

PVC coating shall be primed with a clear acrylic thermosetting solution. The primed parts shall be preheated prior to dipping. The liquid polyvinyl chloride shall be ultraviolet (UV) stabilized and mold-resistant. The coated parts shall be cured. The coating shall be a minimum 2/25 inches thick plus or minus 0.020 inches and shall have an 85 durometer hardness with a slip-resistant finish.

2.3.4 Finish

Finish shall be as specified by the manufacturer or as indicated. Exposed surfaces and edges shall be rounded, polished, or sanded. Finish shall be non-toxic, non-glare, and resistant to corrosion. Exposed surfaces shall be smooth and splinter-free exposed surfaces.

2.3.4.1 Wood Sealants

Exposed wood surfaces shall have, as a minimum, two shop coats of paint, varnish, sealer, or other approved preservative. Sealants shall seal all applied surfaces from air.

2.3.4.2 Paint

Paint shall be factory applied with a minimum of 2 coats. Paint shall be weather-resistant and resistant to cracking, peeling and fading.

2.3.4.3 Exterior Site Furnishing

- a. Bicycle Racks - Bronze/Pyrite
- b. Trash Receptacles - Steel - Bronze, Plastic - Redwood
- c. Benches - Steel - Bronze, Plastic - Redwood

2.4 SITE STANDARDS

Site furnishings shall be furnished with the dimensions and requirements indicated.

2.5 MANUFACTURER'S

a. Benches

DuMor style 6' Seating Bench Model #88-60PL/S-2 Surface plate or approved equal. Submitted equivalent benches should match style and character of installed furniture for the Heavy Brigade Combat Team Facilities 1. Salient characteristics of the benches shall be 6' in length with slated members for seating and backrest, provide steel surface mounting features, and be of a recycled content plastic. Color shall be "Redwood" recycled plastic with Bronze mounting.

b. Trash

DuMor style Trash Receptacle Model #70-22PL or approved equal. Submitted equivalent receptacles should match style and character of installed furniture for the Heavy Brigade Combat Team Facilities 1. Salient characteristics of the trash receptacles shall be free standing, approximately 31" in height and 26" in diameter with slated members, provide an approximate 22 gallon plastic liner and powder coated lid, provide steel surface mounting features, and be of a recycled content plastic. Color shall be "Redwood" recycled plastic with Bronze mounting.

c. Bicycle Racks

DuMor style bicycle racks Model #130-30 S-1 embedment or approved equal. Submitted equivalent bicycle racks should match style and character of installed furniture for the Heavy Brigade Combat Team Facilities 1. Salient characteristics of the bicycle racks shall be 2 3/8" OD, powder coated finish, accommodate 7 bicycles, schedule 40 steel pipes. Color shall be Bronze.

d. Z - Series Tubular Barrier Gates

Hoover Fence Company style Z - Barrier Gate(s) or approved equal. Salient characteristics of the barrier gate(s) shall be 4' height and 10' in width with aluminum post caps, 6-5/8" OD x 8' length schedule 40 gate hinge post, 4" OD x 8' length galvanized SS40 gate latch post, 4" aluminum post caps for gate latch post, 6-5/8" aluminum post caps for gate hinge post 6-5/8" x 2" malleable but hinges and strong arm industrial strength gate latches. Color shall be bronze or approved alternate.

Note: Government approval is required for all substitution or changes from site furnishings listed above.

PART 3 EXECUTION

3.1 INSTALLATION

Verify that finished grades and other operations affecting mounting surfaces have been completed prior to the installation of site furnishings. Site furnishings shall be installed plumb and true, at locations indicated, in accordance with the approved manufacturer's instructions.

3.1.1 Assembly and Erection of Components

New parts shall be acquired from the manufacturer; substitute parts will not be accepted unless approved by the manufacturer. When the inspection of parts has been completed, the site furnishings shall be assembled and anchored according to manufacturer's instructions or as indicated. When site furnishings are assembled at the site, assembly shall not interfere with other operations or pedestrian and vehicular circulation.

3.1.2 Anchorage, Fastenings, and Connections

Furnish metal work, mounting bolts or hardware in ample time for securing into concrete or masonry as the work progresses. Provide anchorage where necessary for fastening furniture or furnishings securely in place. Provide, for anchorage not otherwise specified or indicated, slotted

inserts, expansion shields, and power-driven fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts, and screws for wood. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish the fastenings to which they are applied. Conceal fastenings where practicable.

3.2 WELDING

Perform welding, welding inspection, and corrective welding, in accordance with AWS D1.1/D1.1M. Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation.

3.3 TESTING

Test each site furnishing to ascertain a secure and correct installation. A correct installation shall be according to the manufacturer's recommendations and by the following procedure: Measure the physical dimensions and clearance of each installed site furnishing for compliance with manufacturer's recommendations and as indicated. Site furnishings which do not comply shall be reinstalled. Fasteners and anchors determined to be non-compliant shall be replaced. Provide a written report describing the results of the testing.

3.4 FINISHES

3.4.1 Field Finishes

Where dissimilar metals are in contact, protect surfaces with a coat conforming to SSPC Paint 25 to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, mortar, masonry, wood, or absorptive materials subject to wetting, protect with ASTM D 1187, asphalt-base emulsion.

3.4.2 Repair of Zinc-Coated Surfaces

Repair damaged surfaces with galvanizing repair method and paint conforming to ASTM A 780/A 780M or by the application of stick or thick paste material specifically designed for repair of galvanizing, as approved by the Contracting Officer. Clean areas to be repaired and remove the slag from the welds. Heat surfaces to which stick or paste material is applied, with a torch to a temperature sufficient to melt the metallics in stick or paste; spread the molten material uniformly over surfaces to be coated and wipe the excess material off.

3.5 RESTORATION AND CLEAN UP

When the installation has been completed, clean up and protect the site. Existing areas that have been damaged from the installation operation shall be restored to original condition at Contractor's expense.

3.5.1 Clean Up

The site shall be cleaned of all materials associated with the installation. Site furnishing surfaces shall be cleaned of dirt, stains, filings, and other blemishes occurring from shipment and installation. Cleaning methods and agents shall be according to manufacturer's instructions or as indicated.

3.5.2 Protection

The area shall be protected as required or directed by providing barricades and signage.

3.5.3 Disposal of Materials

Excess and waste material shall be removed and disposed off Government property.

3.6 RE-INSTALLATION

Where re-installation is required, the following shall be accomplished:

a. Re-install the product as specified. Material acquisition of replacement parts is the responsibility of the Contractor. Provide replacement materials that are new and supplied by the original manufacturer to match.

b. Damage caused by the failed installation shall be repaired.

-- End of Section --

SECTION 26 00 00.00 20

BASIC ELECTRICAL MATERIALS AND METHODS

07/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 709 (2001; R 2007) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2 (2007; TIA 2007-1; TIA 2007-2; TIA 2007-3; TIA 2007-4; TIA 2007-5) National Electrical Safety Code

IEEE C57.12.28 (2005) Standard for Pad-Mounted Equipment - Enclosure Integrity

IEEE C57.12.29 (2005) Pad-Mounted Equipment - Enclosure Integrity for Coastal Environments

IEEE Std 100 (2000) The Authoritative Dictionary of IEEE Standards Terms

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250 (2008) Enclosures for Electrical Equipment (1000 Volts Maximum)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2008; AMD 1 2008) National Electrical Code

1.2 RELATED DRAWINGS

This section of the specifications applies to drawing series U-30X, U-40X, U-60X, U-61X, U-83X, and U-87X.

1.3 RELATED REQUIREMENTS

This section applies to all sections of Division 26 and 33, ELECTRICAL and UTILITIES, of this project specification unless specified otherwise in the individual sections.

1.4 DEFINITIONS

- a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE Std 100.

- b. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.
- c. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical sections that describe products, systems, installation procedures, equipment, and test methods.

1.5 ELECTRICAL CHARACTERISTICS

Electrical characteristics for this project shall be 13.2 kV primary, three phase, four wire, 60 Hz. Final connections to the power distribution system shall be made by the Contractor as directed by the Contracting Officer.

1.6 ADDITIONAL SUBMITTALS INFORMATION

Submittals required in other sections that refer to this section must conform to the following additional requirements as applicable.

1.6.1 Shop Drawings (SD-02)

Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.

1.6.2 Product Data (SD-03)

Submittal shall include performance and characteristic curves.

1.7 QUALITY ASSURANCE

1.7.1 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

1.7.2 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on

the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.

1.7.2.1 Material and Equipment Manufacturing Date

Products manufactured more than 1 year prior to date of delivery to site shall not be used, unless specified otherwise.

1.8 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.9 POSTED OPERATING INSTRUCTIONS

Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:

- a. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
- b. Start up, proper adjustment, operating, lubrication, and shutdown procedures.
- c. Safety precautions.
- d. The procedure in the event of equipment failure.
- e. Other items of instruction as recommended by the manufacturer of each system or item of equipment.

Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.10 MANUFACTURER'S NAMEPLATE

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.11 FIELD FABRICATED NAMEPLATES

ASTM D 709. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, white with black. Surface shall be matte finish. Corners shall be square. Accurately align lettering and

engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

1.12 WARNING SIGNS

Provide warning signs for the enclosures of electrical equipment including substations, pad-mounted transformers, pad-mounted switches, generators, and switchgear having a nominal rating exceeding 600 volts.

- a. When the enclosure integrity of such equipment is specified to be in accordance with IEEE C57.12.28 or IEEE C57.12.29, such as for pad-mounted transformers and pad-mounted SF6 switches, provide self-adhesive warning signs on the outside of the high voltage compartment door(s). Sign shall be a decal and shall have nominal dimensions of 7 by 10 inches with the legend "DANGER HIGH VOLTAGE" printed in two lines of nominal 2 inch high letters. The word "DANGER" shall be in white letters on a red background and the words "HIGH VOLTAGE" shall be in black letters on a white background. Decal shall be Panduit No. PPS0710D72 or approved equal.

1.13 ELECTRICAL REQUIREMENTS

Electrical installations shall conform to IEEE C2, NFPA 70, and requirements specified herein.

1.14 INSTRUCTION TO GOVERNMENT PERSONNEL

Where specified in the technical sections, furnish the services of competent instructors to give full instruction to designated Government personnel in the adjustment, operation, and maintenance of the specified systems and equipment, including pertinent safety requirements as required. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. The number of man-days (8 hours per day) of instruction furnished shall be as specified in the individual section. When more than 4 man-days of instruction are specified, use approximately half of the time for classroom instruction. Use other time for instruction with equipment or system. When significant changes or modifications in the equipment or system are made under the terms of the contract, provide additional instructions to acquaint the operating personnel with the changes or modifications.

PART 2 PRODUCTS

2.1 FACTORY APPLIED FINISH

Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test and the additional requirements specified in the technical sections.

PART 3 EXECUTION

3.1 FIELD APPLIED PAINTING

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be

as specified in the section specifying the associated electrical equipment.

3.2 FIELD FABRICATED NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

3.3 WARNING SIGN MOUNTING

Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.

-- End of Section --

SECTION 26 05 00.00 40

COMMON WORK RESULTS FOR ELECTRICAL

11/08

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE Std 100 (2000) The Authoritative Dictionary of
IEEE Standards Terms

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Submit Material, Equipment, and Fixture Lists for the following:

Conduits, Raceway and Fittings
Wire and Cable
Splices and Connectors

SD-03 Product Data

Submit manufacturer's catalog data for the following items:

Conduits, Raceway and Fittings
Wire and Cable
Splices and Connectors

SD-08 Manufacturer's Instructions

Submit Manufacturer's Instructions.

1.3 PREVENTION OF CORROSION

Protect metallic materials against corrosion. Provide equipment enclosures with the standard finish by the manufacturer when used for most indoor installations. Do not use aluminum when in contact with earth or concrete and, where connected to dissimilar metal, protect by approved fittings and treatment. Ferrous metals such as, but not limited to, anchors, bolts, braces, boxes, bodies, clamps, fittings, guards, nuts, pins, rods, shims, thimbles, washers, and miscellaneous spare parts not of corrosion-resistant steel shall be hot-dip galvanized except where other equivalent protective treatment is specifically approved in writing.

1.4 DEFINITIONS

- a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE Std 100.
- b. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.
- c. Vertical assembly. A vertical assembly is a pole, tower or other such support, mounting hardware, arms, brackets and the load. Load can be a luminaire, siren, loudspeaker or other device. All components of a vertical assembly will be rated by the manufacturer to withstand 135 mph wind loading.

1.5 GENERAL REQUIREMENTS

Submit Material, Equipment, and Fixture Lists for the following items showing manufacturer's style or catalog numbers, specification and drawing reference numbers, warranty information, and fabrication site.

Submit Manufacturer's Instructions including special provisions required to install equipment components and system packages. Special notices shall detail impedances, hazards and safety precautions.

Submit Certification required to install equipment components and system packages.

1.6 POSTED OPERATING INSTRUCTIONS

Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:

- a. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
- b. Start up, proper adjustment, operating, lubrication, and shutdown procedures.
- c. Safety precautions.
- d. The procedure in the event of equipment failure.
- e. Other items of instruction as recommended by the manufacturer of each system or item of equipment.

Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and be secured to prevent easy removal or peeling.

1.7 MANUFACTURER'S NAMEPLATE

Each item of equipment shall have a nameplate bearing the manufacturer's

name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

PART 2 PRODUCTS

2.1 MATERIALS

Materials and equipment to be provided shall be the standard cataloged products of manufacturers regularly engaged in the manufacture of the products.

2.2 SPLICES AND CONNECTORS

Make all splices in AWG No. 8 and smaller with approved indentor crimp-type connectors and compression tools.

Make all splices in AWG No. 6 and larger with bolted clamp-type connectors. Joints shall be wrapped with an insulating tape that has an insulation and temperature rating equivalent to that of the conductor.

PART 3 EXECUTION

3.1 CONDUITS, RACEWAYS AND FITTINGS

Conduit runs between outlet and outlet, between fitting and fitting, or between outlet and fitting shall not contain more than the equivalent of three 90-degree bends, including those bends located immediately at the outlet or fitting.

Do not install crushed or deformed conduit. Avoid trapped conduit runs where possible. Take care to prevent the lodgment of foreign material in the conduit, boxes, fittings, and equipment during the course of construction. Clear any clogged conduit of obstructions or be replaced.

Conduit and raceway runs concealed in or behind walls, above ceilings, or exposed on walls and ceilings 5 feet or more above finished floors and not subject to mechanical damage may be electrical metallic tubing (EMT).

3.2 FIELD TESTING

Submit Test Reports in accordance with referenced standards in this section.

After completion of the installation and splicing, and prior to energizing the conductors, perform wire and cable continuity and insulation tests as herein specified before the conductors are energized.

Contractor shall provide all necessary test equipment, labor, and personnel to perform the tests, as herein specified.

Isolate completely all wire and cable from all extraneous electrical connections at cable terminations and joints. Substation and switchboard feeder breakers, disconnects in combination motor starters, circuit breakers in panel boards, and other disconnecting devices shall be used to isolate the circuits under test.

Perform Insulation-Resistance Test on each field-installed conductor with respect to ground and adjacent conductors. Applied potential shall be 500 volts dc for 300 volt rated cable and 1000 volts dc for 600 volt rated

cable. Take readings after 1 minute and until the reading is constant for 15 seconds. Minimum insulation-resistance values shall not be less than 25 Megohms for 300 volt rated cable and 100 Megohms for 600 volt rated cable. For circuits with conductor sizes 8AWG and smaller insulation resistance testing is not required.

Perform Continuity Test to insure correct cable connection (i.e correct phase conductor, grounded conductor, and grounding conductor wiring) end-to-end. Any damages to existing or new electrical equipment resulting from contractor mis-wiring will be repaired and re-verified at contractor's expense. All repairs shall be approved by the CO prior to acceptance of the repair.

Conduct Phase-Rotation Tests on all three-phase circuits using a phase-rotation indicating instrument. Perform phase rotation of electrical connections to connected equipment clockwise, facing the source.

Final acceptance will depend upon the successful performance of wire and cable under test. Do not energize any conductor until the final test reports are reviewed and approved by the CO.

-- End of Section --

SECTION 26 05 71.00 40

LOW VOLTAGE OVERCURRENT PROTECTIVE DEVICES

11/08

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 877 (2002; R 2007) Standard Test Method for Dielectric Breakdown Voltage of Insulating Liquids Using Disk Electrodes

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C57.13 (2008) Standard Requirements for Instrument Transformers

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250 (2008) Enclosures for Electrical Equipment (1000 Volts Maximum)

NEMA AB 1 (2002) Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures

NEMA AB 3 (2001) Molded Case Circuit Breakers and Their Application

NEMA C12.1 (2008) Electric Meters; Code for Electricity Metering

NEMA FU 1 (2002; R 2007) Low Voltage Cartridge Fuses

NEMA ICS 1 (2000; R 2005; R 2008) Standard for Industrial Control and Systems General Requirements

NEMA ICS 2 (2000; Errata 2002; R 2005; Errata 2006) Standard for Industrial Control and Systems: Controllers, Contactors, and Overload Relays Rated Not More than 2000 Volts AC or 750 Volts DC: Part 8 - Disconnect Devices for Use in Industrial Control Equipment

NEMA ICS 6 (1993; R 2006) Standard for Industrial Controls and Systems Enclosures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2008; AMD 1 2008) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 489 (2009) Standard for Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures

1.2 RELATED DRAWINGS

This section of the specifications applies to drawing series U-2XX and U-62X.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Prior to the beginning of construction, submit manufactures equipment and performance data for the following items including use life, system functional flows, safety features, and mechanical automated details..

Fuses

SD-02 Shop Drawings

Submit Connection Diagrams and Fabrication Drawings for the following items in accordance with paragraph entitled, "General Requirements," of this section.

Submit Installation drawings for the following items in accordance with the paragraph entitled, "Installation," of this section.

Control Devices
Protective Devices

SD-03 Product Data

Submit manufacturer's equipment and performance data for the following items including use life, system functional flows, safety features, and mechanical automated details.

Enclosures
Circuit Breakers

SD-08 Manufacturer's Instructions

Submit manufacturer's instructions for the following items, including special provisions required to install equipment components and system packages. Provide detail on resistance impedances, hazards and safety precautions within the special notices.

Control Devices
Protective Devices

SD-10 Operation and Maintenance Data

Submit Operation and Maintenance Manuals for the following equipment:

Circuit Breakers

1.4 GENERAL REQUIREMENTS

Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS applies to work specified in this section.

Submit Connection Diagrams showing the relations and connections of control devices and protective devices by showing the general physical layout of all controls, the interconnection of one system (or portion of system) with another, and internal tubing, wiring, and other devices.

Submit Fabrication Drawings for control devices and protective devices consisting of fabrication and assembly details to be performed in the factory.

PART 2 PRODUCTS

2.1 ENCLOSURES

2.1.1 Equipment Enclosures

Provide enclosures for equipment in accordance with NEMA 250.

Contain equipment installed in wet locations in a NEMA Type 4 watertight, corrosion-resistant sheet-steel enclosure, constructed to prevent entrance of water when tested in accordance with NEMA ICS 6 for Type 4 enclosures.

2.2 CIRCUIT BREAKERS

Provide circuit breakers that conform to UL 489, NEMA AB 1, and NEMA AB 3.

2.2.1 Molded-Case Circuit Breakers

Provide molded case, manually operated, trip-free, circuit breakers, with inverse-time thermal-overload protection and instantaneous magnetic short-circuit protection as required. Completely enclose circuit breakers in a molded case, with the calibrated sensing element factory-sealed to prevent tampering.

Locate thermal-magnetic tripping elements in each pole of the circuit breaker, and provide inverse-time-delay thermal overload protection and instantaneous magnetic short-circuit protection. Provide instantaneous magnetic tripping element, that is adjustable and accessible from the front of the breaker on frame sizes larger than 100 amperes.

Size breaker as required for the continuous current rating of the circuit. Provide breaker class as required.

Provide sufficient interrupting capacity of the panel and lighting branch

circuit breakers, to successfully interrupt the maximum short-circuit current imposed on the circuit at the breaker terminals. Provide circuit breaker interrupting capacities with a minimum of 10,000 amperes and that conform to NEMA AB 3.

Provide the common-trip type multipole circuit breakers having a single operating handle and a two-position on/off indication. Provide circuit breakers with temperature compensation for operation in an ambient temperature of 104 degrees F. Provide circuit breakers that have root mean square (rms) symmetrical interrupting ratings sufficient to protect the circuit being supplied. Interrupting ratings may have selective type tripping (time delay, magnetic, thermal, or ground fault).

Provide phenolic composition breaker body capable of having such accessories as handle-extension, handle-locking, and padlocking devices attached where required.

Provide circuit breakers used for meter circuit disconnects that meet the applicable requirements of NFPA 70 and that are of the motor-circuit protector type.

For circuit breakers used for service disconnection, provide an enclosed circuit-breaker type with external handle for manual operation. Provide sheet metal enclosures with a hinged cover suitable for surface mounting.

2.3 FUSES

Provide a complete set of fuses for all switches and switchgear. Rate fuses that have a voltage rating of not less than the circuit voltage.

Make no change in continuous-current rating, interrupting rating, and clearing or melting time of fuses unless written permission has first been secured.

Provide nonrenewable cartridge type fuses for ratings 30 amperes, 125 volts or less. Provide renewable cartridge type fuses for ratings above 30 amperes 600 volts or less with time-delay dual elements, except where otherwise indicated. Conform to NEMA FU 1 for fuses.

Install special fuses such as extra-high interrupting-capacity fuses, fuses for welding machines, and capacitor fuses where required. Plug fuses are not permitted.

Label fuses showing UL class, interrupting rating, and time-delay characteristics, when applicable. Additionally, clearly list fuse information on equipment drawings.

Provide porcelain fuse holders when field-mounted in a cabinet or box. Do not use fuse holders made of such materials as ebony asbestos, Bakelite, or pressed fiber for field installation.

2.4 CONTROL DEVICES

2.4.1 Magnetic Contactors

Provide magnetic contactors in accordance with NEMA ICS 1 and NEMA ICS 2 as required for the control of low-voltage, 60-hertz, tungsten-lamp loads, fluorescent-lamp loads, resistance-heating loads, and the primary windings of low-voltage transformers.

Provide core-and-coil assembly that operates satisfactorily with coil voltage between 85 and 110 percent of its voltage rating.

Provide contactor that is designed with a normally open holding circuit auxiliary contact for control circuits, with a rating in accordance with NEMA ICS 1 and NEMA ICS 2.

Furnish solderless pressure wire terminal connectors, or make available for line-and-load connections to contactors in accordance with NEMA ICS 1 and NEMA ICS 2.

Provide magnetic contactors with a rating in accordance with NEMA ICS 1 and NEMA ICS 2.

2.4.2 Pushbuttons and Switches

2.4.2.1 Pushbuttons

Provide pushbuttons that are designed with normally open, circuit-closing contacts; normally closed circuit-opening contacts; and two-circuit normally open and normally closed circuit-closing and -opening contacts. Provide pushbutton-contact ratings in accordance with NEMA ICS 1 and NEMA ICS 2 with contact designation A600.

Identify pushbuttons in remote control stations with identification plates affixed to front cover in a prominent location. Carry the identification of the system being controlled on the identification plate.

PART 3 EXECUTION

3.1 INSTALLATION

Install Control devices and protective devices that are not factory installed in equipment, in accordance with the manufacturer's recommendations and field adjusted and operation tested. Conform to NFPA 70, NEMA ICS 1 and NEMA ICS 2 requirements for installation of control and protective devices.

3.2 FIELD TESTING

Demonstrate to operate as indicated control and protective devices not factory installed in equipment.

Ratio and verify tap settings of instrumentation, potential, and current transformers.

Perform dielectric tests on insulating oil in oil circuit breakers before the breakers are energized. Test oil in accordance with ASTM D 877, and provide breakdown voltage that is not less than 25,000 volts. Provide manufacturer certification that the oil contains no PCB's, and affix a label to that effect on each breaker tank and on each oil drum containing the insulating oil.

Field adjust reduced-voltage starting devices to obtain optimum operating conditions. Provide test meters and instrument transformers that conform to NEMA C12.1 and IEEE C57.13.

Do not energize control and protective devices until recorded test data has

been approved. Provide final test reports with a cover letter/sheet clearly marked with the System name, Date, and the words "Final Test Reports - Forward to the Systems Engineer/Condition Monitoring Office/Predictive Testing Group for inclusion in the Maintenance Database."

-- End of Section --

SECTION 26 08 00

APPARATUS INSPECTION AND TESTING

08/08

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS (2009) Standard for Acceptance Testing
Specifications for Electrical Power
Equipment and Systems

1.2 RELATED REQUIREMENTS

Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS applies to this section with additions and modifications specified herein.

1.3 RELATED DRAWINGS

This section of the specifications applies to drawing series U-30X, U-40X, U-60X, U-61X, U-83X, and U-87X.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Acceptance tests and inspections; G

SD-07 Certificates

Qualifications of organization, and lead engineering technician; G

Acceptance test and inspections procedure; G

1.5 QUALITY ASSURANCE

1.5.1 Qualifications

Contractor shall engage the services of a qualified testing organization to provide inspection, testing, calibration, and adjustment of the electrical distribution system and generation equipment listed in paragraph entitled "Acceptance Tests and Inspections" herein. Organization shall be independent of the supplier, manufacturer, and installer of the equipment. The organization shall be a first tier subcontractor. No work required by this section of the specification shall be performed by a second tier subcontractor.

- a. Submit name and qualifications of organization. Organization shall have been regularly engaged in the testing of electrical materials, devices, installations, and systems for a minimum of 5 years. The organization shall have a calibration program, and test instruments used shall be calibrated in accordance with NETA ATS.
- b. Submit name and qualifications of the lead engineering technician performing the required testing services. Include a list of three comparable jobs performed by the technician with specific names and telephone numbers for reference. Testing, inspection, calibration, and adjustments shall be performed by an engineering technician, certified by NETA or the National Institute for Certification in Engineering Technologies (NICET) with a minimum of 5 years' experience inspecting, testing, and calibrating electrical distribution and generation equipment, systems, and devices.

1.5.2 Acceptance Tests and Inspections Reports

Submit certified copies of inspection reports and test reports. Reports shall include certification of compliance with specified requirements, identify deficiencies, and recommend corrective action when appropriate. Type and neatly bind test reports to form a part of the final record. Submit test reports documenting the results of each test not more than 10 days after test is completed.

1.5.3 Acceptance Test and Inspections Procedure

Submit test procedure reports for each item of equipment to be field tested at least 45 days prior to planned testing date. Do not perform testing until after test procedure has been approved.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 ACCEPTANCE TESTS AND INSPECTIONS

Testing organization shall perform acceptance tests and inspections. Test methods, procedures, and test values shall be performed and evaluated in accordance with NETA ATS, the manufacturer's recommendations, and paragraph entitled "Field Quality Control" of each applicable specification section. Tests identified as optional in NETA ATS are not required unless otherwise specified. Equipment shall be placed in service only after completion of required tests and evaluation of the test results have been completed. Contractor shall supply to the testing organization complete sets of shop drawings, settings of adjustable devices, and other information necessary for an accurate test and inspection of the system prior to the performance of any final testing. Contracting Officer shall be notified at least 14 days in advance of when tests will be conducted by the testing organization. Perform acceptance tests and inspections on applicable equipment and systems specified in the following sections:

- a. Section 26 12 19.10 THREE-PHASE PAD-MOUNTED TRANSFORMERS

b. Section 33 71 02.00 20 UNDERGROUND ELECTRICAL DISTRIBUTION

3.2 SYSTEM ACCEPTANCE

Final acceptance of the system is contingent upon satisfactory completion of acceptance tests and inspections.

3.3 PLACING EQUIPMENT IN SERVICE

A representative of the approved testing organization shall be present when equipment tested by the organization is initially energized and placed in service.

-- End of Section --

SECTION 26 12 19.10

THREE-PHASE PAD-MOUNTED TRANSFORMERS

11/09

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 167	(1999; R 2009) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM D 1535	(2008) Specifying Color by the Munsell System
ASTM D 877	(2002; R 2007) Standard Test Method for Dielectric Breakdown Voltage of Insulating Liquids Using Disk Electrodes
ASTM D 92	(2005a) Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester
ASTM D 97	(2009) Pour Point of Petroleum Products

FM GLOBAL (FM)

FM P7825	(2005) Approval Guide
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INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(2007; TIA 2007-1; TIA 2007-2; TIA 2007-3; TIA 2007-4; TIA 2007-5) National Electrical Safety Code
IEEE C37.47	(2000) High Voltage Current-Limiting Type Distribution Class Fuses and Fuse Disconnecting Switches
IEEE C57.12.00	(2006) Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
IEEE C57.12.28	(2005) Standard for Pad-Mounted Equipment - Enclosure Integrity
IEEE C57.12.34	(2004; Errata 2005) Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers, 2500 kVA and Smaller-High-Voltage: 34 500

GrdY/19 920 Volts and Below; Low Voltage:
480 Volts and Below

IEEE C57.12.90 (2006; INT 2009) Standard Test Code for
Liquid-Immersed Distribution, Power, and
Regulating Transformers

IEEE C57.13 (2008) Standard Requirements for
Instrument Transformers

IEEE C57.98 (1993; R 1999) Guide for Transformer
Impulse Tests

IEEE C62.11 (2005; Amendment A 2008) Standard for
Metal-Oxide Surge Arresters for
Alternating Current Power Circuits (>1kV)

IEEE Std 100 (2000) The Authoritative Dictionary of
IEEE Standards Terms

IEEE Std 386 (2006) Standard for Separable Insulated
Connector Systems for Power Distribution
Systems Above 600V

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS (2009) Standard for Acceptance Testing
Specifications for Electrical Power
Equipment and Systems

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA C12.1 (2008) Electric Meters; Code for
Electricity Metering

NEMA C12.10 (2004) Physical Aspects of Watthour Meters

NEMA C12.7 (2005) Requirements for Watthour Meter
Sockets

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2008; AMD 1 2008) National Electrical Code

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD)

OECD Test 203 (1992) Fish Acute Toxicity Test

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 712-C-98-075 (1996) Fate, Transport and Transformation
Test Guidelines - OPPTS 835.3100- "Aerobic
Aquatic Biodegradation"

EPA 821-R-02-012 (2002) Methods for Measuring the Acute
Toxicity of Effluents and Receiving Waters
to Freshwater and Marine Organisms

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

10 CFR 431

Energy Efficiency Program for Certain
Commercial and Industrial Equipment

UNDERWRITERS LABORATORIES (UL)

UL 467

(2007) Standard for Grounding and Bonding
Equipment

1.2 RELATED DRAWINGS

This section of the specifications applies to drawing series U-30X, U-40X, U-60X, U-61X, U-83X, and U-87X.

1.3 RELATED REQUIREMENTS

Section 26 08 00 APPARATUS INSPECTION AND TESTING applies to this section, with the additions and modifications specified herein.

1.4 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE Std 100.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Pad-mounted transformer drawings; G

SD-03 Product Data

Pad-mounted transformers; G

Submittal shall include manufacturer's information for each component, device, insulating fluid, and accessory provided with the transformer.

SD-06 Test Reports

Acceptance checks and tests; G

Submittal shall include acceptance criteria and limits for each test in accordance with NETA ATS "Test Values".

SD-09 Manufacturer's Field Reports

Pad-mounted transformer design tests; G

Pad-mounted transformer routine and other tests; G

SD-10 Operation and Maintenance Data

Transformer(s), Data Package 5; G

Submit operation and maintenance data in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA and as specified herein.

SD-11 Closeout Submittals

Transformer test schedule; G

Submit report of test results as specified by paragraph entitled "Field Quality Control."

1.6 QUALITY ASSURANCE

1.6.1 Pad-Mounted Transformer Drawings

Drawings shall indicate, but not be limited to the following:

- a. An outline drawing, with front, top, and side views.
- b. ANSI nameplate data.
- c. Elementary diagrams and wiring diagrams with terminals identified of watt-hour meter and current transformers.
- d. One-line diagram, including switch(es), current transformers, meters, and fuses.
- e. Manufacturer's published time-current curves (on full size logarithmic paper) of the transformer high side fuses.

1.6.2 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

1.6.3 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

1.6.3.1 Material and Equipment Manufacturing Date

Products manufactured more than 1 year prior to date of delivery to site shall not be used, unless specified otherwise.

1.7 MAINTENANCE

1.7.1 Additions to Operation and Maintenance Data

In addition to requirements of Data Package 5, include the following on the actual transformer(s) provided:

- a. An instruction manual with pertinent items and information highlighted
- b. An outline drawing, front, top, and side views
- c. Prices for spare parts and supply list
- d. Routine and field acceptance test reports
- e. Fuse curves for primary fuses
- f. Information on watt-hour demand meter, CT's, and fuse block
- g. Actual nameplate diagram
- h. Date of purchase

1.8 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

PART 2 PRODUCTS

2.1 PRODUCT COORDINATION

Products and materials not considered to be pad-mounted transformers and related accessories are specified in Section 33 71 02.00 20 UNDERGROUND ELECTRICAL DISTRIBUTION.

2.2 THREE-PHASE PAD-MOUNTED TRANSFORMERS

IEEE C57.12.34, IEEE C57.12.28 and as specified herein.

2.2.1 Compartments

The high- and low-voltage compartments shall be separated by steel isolating barriers extending the full height and depth of the compartments. Compartment doors: hinged lift-off type with stop in open position and three-point latching.

2.2.1.1 High Voltage, Dead-Front

High-voltage compartment shall contain the incoming line, insulated high-voltage load-break connectors, bushing well inserts, feed-thru inserts, six high-voltage bushing wells configured for loop feed

application, load-break switch handle(s), access to oil-immersed fuses, dead-front surge arresters, tap changer handle, connector parking stands with insulated standoff bushings, protective caps, and ground pad.

- a. Insulated high-voltage load-break connectors: IEEE Std 386, rated 15 kV, 95 kV BIL. Current rating: 200 amperes rms continuous. Short time rating: 10,000 amperes rms symmetrical for a time duration of 0.17 seconds. Connector shall have a steel reinforced hook-stick eye, grounding eye, test point, and arc-quenching contact material.
- b. Bushing well inserts and feed-thru inserts: IEEE Std 386, 200 amperes, 15 kV Class. Provide a bushing well insert for each bushing well unless indicated otherwise. Provide feed-thru inserts as indicated.
- c. Load-break switch

Radial-feed oil-immersed type rated at 15 kV, 95 kV BIL, with a continuous current rating and load-break rating of 200 amperes, and a make-and-latch rating of 12,000 rms amperes symmetrical. Locate the switch handle in the high-voltage compartment.

- d. Provide bayonet type, oil-immersed, expulsion fuses in series with oil-immersed, partial-range, current-limiting fuses. Bayonet fuse links shall sense both high currents and high oil temperature in order to provide thermal protection to the transformer. Coordinate transformer protection with expulsion fuse clearing low-current faults and current-limiting fuse clearing high-current faults beyond the interrupting rating of the expulsion fuse. In order to eliminate or minimize oil spills, the bayonet fuse assembly shall include an oil retention valve inside the housing which closes when the fuse holder is removed and an external drip shield. Warning shall be conspicuously displayed within the high-voltage compartment cautioning against removing or inserting fuses unless the load-break switch is in the open position and the tank pressure has been released.

Bayonet fuse assembly: 150 kV BIL.

Oil-immersed current-limiting fuses: IEEE C37.47; 50,000 rms amperes symmetrical interrupting rating at the system voltage specified. Connect current-limiting fuses ahead of the radial-feed load-break switch.

- e. Surge arresters: IEEE C62.11, rated 10 kV, 8.4 kV MCOV, fully shielded, dead-front, metal-oxide-varistor, elbow type with resistance-graded gap, suitable for plugging into inserts. Provide three arresters for radial feed circuits. Provide six arresters for loop feed circuits.
- f. Parking stands: Provide a parking stand near each bushing well. Provide insulated standoff bushings for parking of energized load-break connectors on parking stands.
- g. Protective caps: IEEE Std 386, 200 amperes, 15 kV Class. Provide insulated protective caps (not shipping caps) for insulating and sealing out moisture from unused bushing well inserts and insulated standoff bushings.

2.2.1.2 Low Voltage

Low-voltage compartment shall contain low-voltage bushings with NEMA spade terminals, accessories, metering, stainless steel or laser-etched anodized aluminum diagrammatic transformer nameplate, and ground pad.

- a. Accessories shall include drain valve with sampler device, fill plug, pressure relief device, liquid level gage, pressure-vacuum gage, and dial type thermometer with maximum temperature indicator.
- b. Metering: NEMA C12.10. Provide a socket-mounted electronic programmable outdoor watthour meter, surface mounted flush against the side of the low-voltage compartment as indicated. Meter shall either be programmed at the factory or shall be programmed in the field. When field programming is performed, turn field programming device over to the Contracting Officer at completion of project. Meter shall be coordinated to system requirements.
 1. Design: Provide meter designed for use on a 3-phase, 4-wire, 208Y/120 or 480Y/277 volt system with 3 current transformers. Include necessary KYZ pulse initiation hardware for Energy Monitoring and Control System (EMCS).
 2. Coordination: Provide meter coordinated with ratios of current transformers and transformer secondary voltage.
 3. Class: 20; Form: 9S; Accuracy: +/- 1.0 percent; Finish: Class II
 4. Cover: Polycarbonate and lockable to prevent tampering and unauthorized removal.
 5. Kilowatt-hour Register: five digit electronic programmable type
 6. Demand Register:
 - (a) Provide solid state
 - (b) Meter reading multiplier: Indicate multiplier on the meter face.
 - (c) Demand interval length: shall be programmed for 15minutes with rolling demand up to six subintervals per interval.
 7. Meter fusing: Provide a fuse block mounted in the secondary compartment containing one fuse per phase to protect the voltage input to the watthour meter. Size fuses as recommended by the meter manufacturer.
 8. Socket: NEMA C12.7. Provide NEMA Type 3R, box-mounted socket having automatic circuit-closing bypass and having jaws compatible with requirements of the meter. Cover unused hub openings with blank hub plates. Paint box Munsell 7GY3.29/1.5 green to match the pad-mounted transformer to which the box-mounted socket is attached. The Munsell color notation is specified in ASTM D 1535.
 9. Current transformers: IEEE C57.13. Provide butyl-molded window type current transformers with 600-volt insulation, 10 kV BIL and mount on the low-voltage bushings. Route current transformer leads in a location as remote as possible from the power transformer

secondary cables to permit current measurements to be taken with hook-on-ammeters. Provide three current transformers per power transformer with characteristics listed in the following table.

kVA	Sec. Volt	CT Ratio	RF	Meter Acc. Class
75	480Y/277	200/5,	4.0,	0.3 thru B-0.1
112.5	480Y/277	200/5,	4.0,	0.3 thru B-0.1
150	480Y/277	200/5,	4.0,	0.3 thru B-0.1
225	480Y/277	200/5,	4.0,	0.3 thru B-0.1
300	480Y/277	300/5,	3.0,	0.3 thru B-0.2
500	480Y/277	600/5,	3.0,	0.3 thru B-0.5
750	480Y/277	800/5,	2.0,	0.3 thru B-0.5
1000	480Y/277	1200/5,	1.5,	0.3 thru B-0.5
1500	480Y/277	1500/5,	1.5,	0.3 thru B-0.9
2000	480Y/277	2000/5,	1.5,	0.3 thru B-1.8
2500	480Y/277	3000/5,	1.33,	0.3 thru B-1.8

2.2.2 Transformer

- a. Less-flammable liquid-insulated, two winding, 60 hertz, 65 degrees C rise above a 30 degrees C average ambient, self-cooled type.
- b. Transformer shall be rated as indicated on the drawings, 95 kV BIL.
- c. Transformer voltage ratings shall be as indicated on the drawings. For GrdY - GrdY transformers, provide transformer with five-legged core design for third harmonic suppression.
- d. Tap changer shall be externally operated, manual type for changing tap setting when the transformer is de-energized. Provide four 2.5 percent full capacity taps, two above and two below rated primary voltage. Tap changers shall clearly indicate which tap setting is in use.
- e. Audible sound levels shall comply with the following:

<u>kVA</u>	<u>DECIBELS (MAX)</u>
75	51
112.5	55
150	55
225	55
300	55
500	56
750	57
1000	58
1500	60
2000	61

- f. Transformer shall include lifting lugs and provisions for jacking under base. The transformer base construction shall be suitable for using rollers or skidding in any direction. Provide transformer top with an access handhole. Transformer shall have its kVA rating conspicuously displayed on its enclosure. The transformer shall have an insulated low-voltage neutral bushing with NEMA spade terminal, and with removable ground strap.

2.2.2.1 Specified Transformer Efficiencies

Provide transformer efficiency calculations utilizing the no-load and load

losses. No-load losses (NLL) shall be referenced at 20 degrees C. Load losses (LL) shall be referenced at 85 degrees C and at 50 percent of the nameplate load. If the tested transformer efficiency is less than the efficiency indicated in 10 CFR 431, Subpart K, paragraph 431.196(b), the transformer is not acceptable.

2.2.3 Insulating Liquid

- a. Less-flammable transformer liquids: NFPA 70 and FM P7825 for less-flammable liquids having a fire point not less than 300 degrees C tested per ASTM D 92 and a dielectric strength not less than 33 kV tested per ASTM D 877. Provide identification of transformer as "non-PCB" and "manufacturer's name and type of fluid" on the nameplate.

The fluid shall be a biodegradable electrical insulating and cooling liquid classified by UL and approved by FM as "less flammable" fluids. The fluid shall meet the following fluid properties:

1. Pour point: ASTM D 97, less than -15 degree C
2. Aquatic biodegradation: EPA 712-C-98-075, 100%
3. Trout toxicity: OECD Test 203, zero mortality of EPA 821-R-02-012, pass

2.2.3.1 Liquid-Filled Transformer Nameplates

Distribution transformers shall be provided with nameplate information in accordance with IEEE C57.12.00 and as modified or supplemented by this section.

2.2.4 Corrosion Protection

Bases and cabinets of transformers shall be corrosion resistant and shall be fabricated of stainless steel conforming to ASTM A 167, Type 304 or 304L. Base shall include any part of pad-mounted transformer that is within 3 inches of concrete pad.

Paint bases, cabinets, and tanks Munsell 7GY3.29/1.5 green. Paint coating system shall comply with IEEE C57.12.28. The Munsell color notation is specified in ASTM D 1535.

2.3 WARNING SIGNS

Provide warning signs for the enclosures of pad-mounted transformers having a nominal rating exceeding 600 volts.

- a. When the enclosure integrity of such equipment is specified to be in accordance with IEEE C57.12.28, such as for pad-mounted transformers, provide self-adhesive warning signs on the outside of the high voltage compartment door(s). Sign shall be a decal and shall have nominal dimensions of 7 by 10 inches with the legend "DANGER HIGH VOLTAGE" printed in two lines of nominal 2 inch high letters. The word "DANGER" shall be in white letters on a red background and the words "HIGH VOLTAGE" shall be in black letters on a white background. Decal shall be Panduit No. PPS0710D72 or approved equal.

2.4 GROUNDING AND BONDING

UL 467. Provide grounding and bonding as specified in Section 33 71 02.00 20 UNDERGROUND ELECTRICAL UNDERGROUND.

2.5 PADLOCKS

Padlocks shall be provided for pad-mounted equipment. Padlocks shall be keyed alike.

2.6 CAST-IN-PLACE CONCRETE

Concrete associated with electrical work for other than encasement of underground ducts shall be 4000 psi minimum 28-day compressive strength unless specified otherwise. All concrete shall conform to the requirements of Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE.

2.7 SOURCE QUALITY CONTROL

2.7.1 Transformer Test Schedule

The Government reserves the right to witness tests. Provide transformer test schedule for tests to be performed at the manufacturer's test facility. Submit required test schedule and location, and notify the Contracting Officer 30 calendar days before scheduled test date. Notify Contracting Officer 15 calendar days in advance of changes to scheduled date.

a. Test Instrument Calibration

1. The manufacturer shall have a calibration program which assures that all applicable test instruments are maintained within rated accuracy.
2. The accuracy shall be directly traceable to the National Institute of Standards and Technology.
3. Instrument calibration frequency schedule shall not exceed 12 months for both test floor instruments and leased specialty equipment.
4. Dated calibration labels shall be visible on all test equipment.
5. Calibrating standard shall be of higher accuracy than that of the instrument tested.
6. Keep up-to-date records that indicate dates and test results of instruments calibrated or tested. For instruments calibrated by the manufacturer on a routine basis, in lieu of third party calibration, include the following:
 - (a) Maintain up-to-date instrument calibration instructions and procedures for each test instrument.
 - (b) Identify the third party/laboratory calibrated instrument to verify that calibrating standard is met.

2.7.2 Design Tests

IEEE C57.12.00 states that "design tests are made only on representative apparatus to substantiate the ratings assigned to all other apparatus of basically the same design." Submit design test reports (complete with test data, explanations, formulas, and results), in the same submittal package as the catalog data and drawings for each of the specified transformer(s). Design tests shall have been performed in accordance with IEEE C57.12.90 prior to the award of this contract.

- a. Tests shall be certified and signed by a registered professional engineer.
- b. Temperature rise: "Basically the same design" for the temperature rise test means a pad-mounted transformer with the same coil construction (such as wire wound primary and sheet wound secondary), the same kVA, the same cooling type (ONAN), the same temperature rise rating, and the same insulating liquid as the transformer specified.
- c. Lightning impulse: "Basically the same design" for the lightning impulse dielectric test means a pad-mounted transformer with the same BIL, the same coil construction (such as wire wound primary and sheet wound secondary), and a tap changer, if specified. Design lightning impulse tests shall include the primary windings only of that transformer.
 1. IEEE C57.12.90, paragraph 10.3 entitled "Lightning Impulse Test Procedures," and IEEE C57.98.
 2. State test voltage levels.
 3. Provide photographs of oscilloscope display waveforms or plots of digitized waveforms with test report.
- d. Lifting and moving devices: "Basically the same design" requirement for the lifting and moving devices test means a test report confirming that the lifting device being used is capable of handling the weight of the specified transformer in accordance with IEEE C57.12.34.
- e. Pressure: "Basically the same design" for the pressure test means a pad-mounted transformer with a tank volume within 30 percent of the tank volume of the transformer specified.
- f. Short circuit: "Basically the same design" for the short circuit test means a pad-mounted transformer with the same kVA as the transformer specified.

2.7.3 Routine and Other Tests

IEEE C57.12.00. Routine and other tests shall be performed in accordance with IEEE C57.12.90 by the manufacturer on each of the actual transformer(s) prepared for this project to ensure that the design performance is maintained in production. Submit test reports, by serial number and receive approval before delivery of equipment to the project site. Required tests and testing sequence shall be as follows:

- a. Phase relation
- b. Ratio

- c. No-load losses (NLL) and excitation current
- d. Load losses (LL) and impedance voltage
- e. Dielectric
 - 1. Impulse
 - 2. Applied voltage
 - 3. Induced voltage
- f. Leak

PART 3 EXECUTION

3.1 INSTALLATION

Electrical installations shall conform to IEEE C2, NFPA 70, and to the requirements specified herein. Provide new equipment and materials unless indicated or specified otherwise.

3.2 GROUNDING

NFPA 70 and IEEE C2, except that grounding systems shall have a resistance to solid earth ground not exceeding 5 ohms.

3.2.1 Grounding Electrodes

Provide driven ground rods as specified in Section 33 71 02.00 20 UNDERGROUND ELECTRICAL DISTRIBUTION. Connect ground conductors to the upper end of ground rods by exothermic weld or compression connector. Provide compression connectors at equipment end of ground conductors.

3.2.2 Pad-Mounted Transformer Grounding

Provide separate copper grounding conductors and connect them to the ground loop as indicated. When work in addition to that indicated or specified is required to obtain the specified ground resistance, the provision of the contract covering "Changes" shall apply.

3.2.3 Connections

Make joints in grounding conductors and loops by exothermic weld or compression connector. Exothermic welds and compression connectors shall be installed as specified in Section 33 71 02.00 20 UNDERGROUND ELECTRICAL DISTRIBUTION.

3.2.4 Grounding and Bonding Equipment

UL 467, except as indicated or specified otherwise.

3.3 INSTALLATION OF EQUIPMENT AND ASSEMBLIES

Install and connect pad-mounted transformers furnished under this section as indicated on project drawings, the approved shop drawings, and as specified herein.

3.3.1 Meters and Current Transformers

NEMA C12.1.

3.4 FIELD APPLIED PAINTING

Where field painting of enclosures is required to correct damage to the manufacturer's factory applied coatings, provide manufacturer's recommended coatings and apply in accordance with manufacturer's instructions.

3.5 FOUNDATION FOR EQUIPMENT AND ASSEMBLIES

Mount transformer on concrete slab. Unless otherwise indicated, the slab shall be at least 8 inches thick, reinforced with a 6 by 6 - W2.9 by W2.9 mesh, placed uniformly 4 inches from the top of the slab. Slab shall be placed on a 6 inch thick, well-compacted gravel base. Top of concrete slab shall be approximately 4 inches above finished grade with gradual slope for drainage. Edges above grade shall have 1/2 inch chamfer. Slab shall be of adequate size to project at least 8 inches beyond the equipment.

Stub up conduits, with bushings, 2 inches into cable wells in the concrete pad. Coordinate dimensions of cable wells with transformer cable training areas.

3.5.1 Cast-In-Place Concrete

Cast-in-place concrete work shall conform to the requirements of Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE.

3.5.2 Sealing

When the installation is complete, the Contractor shall seal all entries into the equipment enclosure with an approved sealing method. Seals shall be of sufficient strength and durability to protect all energized live parts of the equipment from rodents, insects, or other foreign matter.

3.6 FIELD QUALITY CONTROL

3.6.1 Performance of Acceptance Checks and Tests

Perform in accordance with the manufacturer's recommendations and include the following visual and mechanical inspections and electrical tests, performed in accordance with NETA ATS.

3.6.1.1 Pad-Mounted Transformers

a. Visual and mechanical inspection

1. Compare equipment nameplate data with specifications and approved shop drawings.
2. Inspect physical and mechanical condition. Check for damaged or cracked insulators and leaks.
3. Inspect anchorage, alignment, and grounding.
4. Verify the presence of PCB content labeling.
5. Verify the bushings and transformer interiors are clean.

6. Inspect all bolted electrical connections for high resistance using low-resistance ohmmeter, verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method, or performing thermographic survey.
7. Verify correct liquid level in tanks and bushings.
8. Verify that positive pressure is maintained on gas-blanketed transformers.
9. Perform specific inspections and mechanical tests as recommended by manufacturer.
10. Verify de-energized tap changer position is left as specified.
11. Verify the presence of transformer surge arresters.

b. Electrical tests

1. Perform resistance measurements through all bolted connections with low-resistance ohmmeter.
2. Verify proper secondary voltage phase-to-phase and phase-to-neutral after energization and prior to loading.

3.6.1.2 Current Transformers

a. Visual and mechanical inspection

1. Compare equipment nameplate data with specifications and approved shop drawings.
2. Inspect physical and mechanical condition.
3. Verify correct connection.
4. Verify that adequate clearances exist between primary and secondary circuit wiring.
5. Verify the unit is clean.
6. Inspect all bolted electrical connections for high resistance using low-resistance ohmmeter, verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method, or performing thermographic survey.
7. Verify that all required grounding and shorting connections provide good contact.
8. Verify correct operation of transformer withdrawal mechanism and grounding operation.
9. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.

b. Electrical tests

1. Perform resistance measurements through all bolted connections

with low-resistance ohmmeter, if applicable.

2. Perform insulation-resistance test of each current transformer and its secondary wiring.
3. Perform a polarity test of each current transformer.
4. Perform a ratio-verification test.

3.6.1.3 Watthour Meter

a. Visual and mechanical inspection

1. Compare equipment nameplate data with specifications and approved shop drawings.
2. Inspect physical and mechanical condition.
3. Verify tightness of electrical connections.

b. Electrical tests

1. Calibrate watthour meters according to manufacturer's published data.
2. Verify that correct multiplier has been placed on face of meter, where applicable.
3. Verify that current transformer secondary circuits are intact.

3.6.1.4 Grounding System

a. Visual and mechanical inspection

1. Inspect ground system for compliance with contract plans and specifications.

b. Electrical tests

1. Perform ground-impedance measurements utilizing the fall-of-potential method. On systems consisting of interconnected ground rods, perform tests after interconnections are complete. On systems consisting of a single ground rod perform tests before any wire is connected. Take measurements in normally dry weather, not less than 48 hours after rainfall. Use a portable ground testing megger in accordance with manufacturer's instructions to test each ground or group of grounds. The instrument shall be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground rod or grounding systems under test.
2. Submit the measured ground resistance of each ground rod and grounding system, indicating the location of the rod and grounding system. Include the test method and test setup (i.e., pin location) used to determine ground resistance and soil conditions at the time the measurements were made.

3.6.2 Follow-Up Verification

Upon completion of acceptance checks and tests, the Contractor shall show by demonstration in service that circuits and devices are in good operating condition and properly performing the intended function. As an exception to requirements stated elsewhere in the contract, the Contracting Officer shall be given 5 working days advance notice of the dates and times of checking and testing.

-- End of Section --

SECTION 26 24 16.00 40

PANELBOARDS

11/08

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

EIA 416 (1974; R 1981) Standard for Filters, for Radio Interference

EIA 46 (1987) Test Procedure for Resistance to Soldering (Vapor Phase Technique) for Surface Mount Devices

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250 (2008) Enclosures for Electrical Equipment (1000 Volts Maximum)

NEMA AB 1 (2002) Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures

NEMA PB 1 (2006; Errata 2008) Standard for Panelboards

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2008; AMD 1 2008) National Electrical Code

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-HDBK 232 (Rev A) Red/Black Engineering Installation Guidelines

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-595 (Rev B; Am 1) Colors Used in Government Procurement

UNDERWRITERS LABORATORIES (UL)

UL 67 (1993; Rev thru Jul 2008) Standard for Panelboards

1.2 GENERAL REQUIREMENTS

Submit Detail Drawings for the panelboards consisting of fabrication and assembly drawings for all parts of the work in sufficient detail to enable the Government to check conformity with the requirements of the contract

documents. Include within drawings details of bus layout.

Ensure Outline Drawings for panelboards indicate overall physical features, dimensions, ratings, service requirements, and weights of equipment.

Statements signed by responsible officials of a manufacturer of a product, system, or material attesting that the product, system or material meet specified requirements. Statements must be dated after the award of this contract, name the project, and list the specific requirements which it is intended to address.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Submit Detail Drawings and Outline Drawings for panelboards in accordance with paragraph entitled, "General Requirements," of this section.

SD-03 Product Data

Submit Manufacturer's catalog data for the following items:

Panelboards
Directory Card and Holder
Filtered Panelboard

SD-04 Samples

Ensure that keys are properly tagged and delivered to the Contracting Officer.

SD-06 Test Reports

Submit test reports for the following tests in accordance with the paragraph entitled, "Site Testing," of this section. Do not energize panelboards until the recorded test data has been submitted to and approved by the Contracting Officer.

Continuity Tests
Insulation Tests

SD-07 Certificates

Submit Statements in accordance with paragraph entitled, "General Requirements," of this section.

SD-08 Manufacturer's Instructions

Submit Manufacturer's instructions for Panelboards including special provisions required to install equipment components and system packages. Special notices shall detail impedances, hazards and safety precautions.

PART 2 PRODUCTS

2.1 PANELBOARDS

Totally enclose power-distribution panelboards and lighting and appliance branch-circuit panelboards in a steel cabinet, dead-front circuit breaker type with copper buses, surface- or flush-mounted as indicated. Ensure panelboards conform to NEMA PB 1 and NEMA AB 1. Branch circuit panels shall have buses fabricated for bolt-on type circuit breakers.

An outer door or cover, hinged on one side, shall be provided on surface-mounted panelboards to provide gutter space access. Provide a center door for circuit breaker/switch access only.

Voltage and current rating, number of phases, and number of wires shall be as indicated. Provide four-wire distribution panelboards and lighting and appliance branch-circuit panelboards with an isolated full-capacity neutral bus. Ensure panelboards are rated for 277/480-volt, three-phase, 60-hertz current.

Provide three-phase, 4-wire, 3-wire distribution lighting and branch circuit panelboards with an isolated full-capacity bus providing spaces for single-pole circuit breakers/switches and spaces indicated as spare.

Provide panelboards with a separate grounding bus bonded to the enclosure. Grounding bus shall be a solid bus bar of rectangular cross section equipped with binding screws for the connection of equipment grounding conductors.

Each panelboard, as a complete unit, shall have a short-circuit current rating equal to or greater than the integrated equipment rating shown on the panelboard schedule or as indicated.

Ensure panelboards and main lugs or main breaker have current ratings as shown on the panelboard schedule.

Bus bar connections to the branch circuit breakers shall be the "distributed phase" or "phase sequence" type. Single-phase, three-wire panelboard busing shall be such that when any two adjacent single-pole breakers are connected to opposite phases, two-pole breakers can be installed in any location. Three-phase, four-wire busing shall be such that when any three adjacent single-pole breakers are individually connected to each of the three different phases, two- or three-pole breakers can be installed at any location. Current-carrying parts of the bus assembly shall be plated. Mains ratings shall be as shown.

Mechanical lugs furnished with panelboards shall be cast copper or copper alloys of sizes suitable for the conductors indicated to be connected thereto.

Boxes shall have the manufacturer's standard knockouts and shall be galvanized code-gage sheet steel. Fronts shall be of code-gage sheet steel furnished with hinged doors with adjustable trim clamps for securing the fronts to the boxes.

Panelboard enclosures shall be NEMA 250, Type 1. Provide enclosures with hinged fronts and corrosion-resistant steel pin-tumbler cylinder locks. Key locks alike and provide two keys for each enclosure.

Finish panelboards with baked enamel. Finish color is to be No. 61 gray conforming to FED-STD-595.

2.2 CIRCUIT BREAKERS

Circuit breakers shall be the molded-case type. Frame and trip ratings shall be as indicated.

Interrupting rating of circuit breakers shall be as indicated. If not shown, the interrupting rating for circuit breakers in 120/208 -volt panelboards shall be not less than 10,000 amperes rms symmetrical, and that for breakers in 277/480 -volt panelboards shall be not less than 25,000 amperes rms symmetrical.

Circuit breakers shall be bolt-on type. Plug-in type is not acceptable.

Provide shunt trips where indicated.

In branch circuit panelboards, branch circuit breakers feeding convenience outlets shall have sensitive instantaneous trip settings of not more than 10 times the trip rating of the breaker to prevent repeated arcing shorts resulting from frayed appliance cords. Single-pole 15- and 20-ampere circuit breakers shall be UL listed as "Switching Breakers" at 277 volts ac. Provide UL Class A (5-milliampere sensitivity) ground fault circuit protection on 120-volt ac branch circuit as indicated. This protection is an integral part of the branch circuit breaker that also provides overload and short-circuit protection for branch circuit wiring. Tripping of a branch circuit breaker containing ground fault circuit interruption is not to disturb the feeder circuit to the panelboard. A single-pole circuit breaker with integral ground fault circuit interruption requires no more panelboard branch circuit space than a conventional slide pole circuit breaker.

Ensure connections to the bus are bolt-on type.

When multiple wires per phase are specified, furnish the circuit breakers with connectors made to accommodate multiple wires.

Ensure circuit breaker spaces called out on the drawings are complete with mounting hardware to permit ready installation of the circuit breakers.

2.3 DIRECTORY CARD AND HOLDER

Mount a directory card on the inside of hinged fronts and doors 0.030-inch thick minimum plastic in a metal frame, with spaces for circuit numbers, outlets controlled, and room numbers. Where hinged fronts or doors are not required, provide the directory card 0.030-inch thick minimum plastic in a metal frame mounted on the left-hand side of the front trim. Directory card shall identify each branch circuit with its respective and numbered circuit breaker.

2.4 FILTERED PANELBOARDS

2.4.1 General

Design panelboards for the distribution, control, and protection of electrical circuits, providing filtering and shielding performance and, when specified, conforming to MIL-HDBK 232. (Portions of MIL-HDBK 232 are

classified and will be available only on classified projects to approved companies and individuals.)

Panelboard cabinet shall be 12-gage steel minimum, with corrosion-resistant finish and four external mounting brackets welded to the case. Front door and trim shall be of code gage steel, with gray finish, equipped with directory, holder, adjustable trim clamps, hinges, self-latching catch, tumbler lock and key and shall bear the UL label. Provide a red diagonal strip across the outside surface of door and trim.

2.4.2 RF Shielding

Ensure circuit breaker and filter compartments are completely radio-frequency (RF) shielded and in compliance with specified shielding requirements with front door open. Case seams shall be continuous inert gas welded. Fit removable circuit breaker actuator faceplate and the filter compartment cover with corrosion-resistant RF gasketing material and install in place with suitable fasteners having a maximum spacing of 3 inches on center. Mount RF filter units to the internal shield wall with similar RF gasketing to ensure RF shielding integrity.

2.4.3 Circuit Breaker Actuators

Design circuit breaker operating mechanisms to maintain RF shielding effectiveness without limit to time or number of operations.

2.4.4 Terminals

Filter terminals shall be of high-temperature alumina ceramic, continuously brazed to filter case. Do not use soft solder. Ceramic terminal shall incorporate a permanently attached flexible lead, with a suitable electric lug. Incoming service connections shall be made to the filter lead at a UL-approved, flame-retardant standoff insulator, mounted in the filter compartment.

2.4.5 Attenuation

Ensure each filter provides a minimum insertion loss of 100 dB over the frequency range of 14 kilohertz (kHz) to 10 gigahertz (GHz). Full rated load insertion loss of 100 dB in the frequency range 14 kHz to 20 megahertz (MHz), to 14 kHz shall be measured by a Government-approved laboratory.

2.4.6 Current

Each filter unit shall be capable of carrying its full rated current continuously without heat rise exceeding 122 degrees F above ambient temperature. Each filter shall be capable of withstanding a 100 -percent overload for 30 seconds without damage.

2.4.7 Voltage

Each filter unit shall be capable of continuous operation at its full rated voltage and withstanding an initial voltage test of twice its rated voltage without damage.

2.4.8 Circuit Breakers

Ensure circuit breakers are rated a minimum 10,000 amperes asymmetrical ac interrupting capacity, 5,000 amperes dc, and are in accordance with

NEMA AB 1.

2.4.9 RF Filters

Design RF filter units to suppress and reduce the amplitude of undesired RF energy conducted by power service lines. Design RF filter units in compliance with the applicable requirements of EIA 416.

Filter cases shall be made of steel, 16-gage minimum, corrosion-resistant finish with a blue lacquer over zinc chromate primer. Conductive grounding surfaces shall be either plated or made of corrosion-resistant steel. Hermetic seams are to be continuous inert gas welded; do not use soft solder. Firmly mount internal components to withstand applicable shock and vibration test requirements without damage.

Fluid impregnant shall conform to UL nonflammable classification. Internal components shall be fully impregnated and intimately immersed in the fluid to obtain the full benefit of cooling by convection flow through the liquid medium to filter case. Completely fill filter case with the fluid impregnant.

2.4.10 Filter Discharge Unit

Install a filter discharge unit for three-filtered circuits on the panelboard. Unit shall meet applicable requirements of EIA 46, and be installed in accordance with NFPA 70.

2.5 FACTORY TESTING

Test complete panelboards in accordance with UL 67.

2.6 PRECAUTIONARY LABEL

To ensure persons are aware of immediate or potential hazard in the application, installation, use, or maintenance of panelboards, each panelboard shall be conspicuously marked on the trim or dead front shield with the text (or equivalent) **DANGER** symbol. If the panel is supplied with a door, ensure the label is visible when the door is in the open position.

PART 3 EXECUTION

3.1 INSTALLATION

Install panelboards as indicated and in accordance with the manufacturer's instructions. Fully align and mount panels so that the height of the top operating handle does not exceed 72-inches above the finished floor.

Directory-card information shall be typewritten in capital letters to indicate outlets controlled and final room numbers served by each circuit and shall be mounted in holders behind protective covering.

3.2 SITE TESTING

Each panelboard enclosure key shall be shown to operate the enclosure locks in the presence of the Contracting Officer.

Panelboards shall be given continuity and insulation tests after the installation has been completed and before the panelboard is energized.

Provide test equipment, labor, and personnel as required to perform the tests as specified. Conduct Continuity tests using a dc device with bell .

Conduct insulation tests on 480-volt panelboards using a 1,000-volt insulation-resistance test set. Record readings every minute until three equal and consecutive readings have been obtained. Resistance between phase conductors and between phase conductors and ground shall be not less than 50 megohms.

Conduct insulation tests on panelboards rated 300 volts or less using a 500-volt minimum insulation-resistance test set. Record readings after 1 minute and until the reading is constant for 15 seconds. Resistance between phase conductors and between phase conductors and ground shall be not less than 25 megohms.

Record test data and include the location and identification of panelboards and megohm readings versus time.

-- End of Section --

SECTION 26 56 00

EXTERIOR LIGHTING

07/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO LTS-4 (2006) Standard Specifications for
Structural Supports for Highway Signs,
Luminaires and Traffic Signals

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C136.21 (2004) Roadway Lighting Equipment -
Vertical Tenons Used with Post-Top-Mounted
Luminaires

ASTM INTERNATIONAL (ASTM)

ASTM A 153/A 153M (2009) Standard Specification for Zinc
Coating (Hot-Dip) on Iron and Steel
Hardware

ASTM B 108 (2006) Standard Specification for
Aluminum-Alloy Permanent Mold Castings

ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA)

IESNA HB-9 (2000; Errata 2004; Errata 2005) IES
Lighting Handbook

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2 (2007; TIA 2007-1; TIA 2007-2; TIA 2007-3;
TIA 2007-4; TIA 2007-5) National
Electrical Safety Code

IEEE Std 100 (2000) The Authoritative Dictionary of
IEEE Standards Terms

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250 (2008) Enclosures for Electrical Equipment
(1000 Volts Maximum)

NEMA ANSLG C78.42 (2007) Standard for High-Pressure Sodium
Lamps

NEMA C136.13 (2004) Roadway Lighting Equipment, Metal

Brackets for Wood Poles

NEMA C136.3	(2005) Roadway and Area Lighting Equipment Luminaire Attachments
NEMA C78.43	(2007) Standard for Electric Lamps - Single-Ended Metal-Halide Lamps
NEMA C82.4	(2002) Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)
NEMA ICS 2	(2000; Errata 2002; R 2005; Errata 2006) Standard for Industrial Control and Systems: Controllers, Contactors, and Overload Relays Rated Not More than 2000 Volts AC or 750 Volts DC: Part 8 - Disconnect Devices for Use in Industrial Control Equipment
NEMA ICS 6	(1993; R 2006) Standard for Industrial Controls and Systems Enclosures
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)	
NFPA 70	(2008; AMD 1 2008) National Electrical Code
U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)	
Energy Star	(1992; R 2006) Energy Star Energy Efficiency Labeling System
UNDERWRITERS LABORATORIES (UL)	
UL 1029	(1994; Rev thru Dec 2007) Standard for Safety High-Intensity-Discharge Lamp Ballasts
UL 1598	(2004; Rev thru May 2006) Luminaires
UL 773	(1995; Rev thru Mar 2002) Standard for Plug-In Locking Type Photocontrols for Use with Area Lighting
UL 773A	(2006) Nonindustrial Photoelectric Switches for Lighting Control

1.2 DEFINITIONS

- a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE Std 100.
- b. Average life is the time after which 50 percent will have failed and 50 percent will have survived under normal conditions.
- c. Groundline section is that portion between one foot above and 2 feet below the groundline.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Luminaire drawings; G

Poles; G

SD-03 Product Data

Local/Regional Materials

Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

Energy Efficiency

Luminaires; G

Lamps; G

Ballasts; G

Lighting contactor; G

Time switch; G

Photocell switch; G

Aluminum poles; G

Brackets

SD-04 Samples

Luminaires; G

Submit one sample of each luminaire type, complete with lamp and ballast. Sample will be returned to the Contractor for installation in the project work.

SD-05 Design Data

Design Data for luminaires; G

SD-06 Test Reports

SD-08 Manufacturer's Instructions

Aluminum poles

SD-10 Operation and Maintenance Data

Operational Service

Submit documentation that includes contact information, summary of procedures, and the limitations and conditions applicable to the project. Indicate manufacturer's commitment to reclaim materials for recycling and/or reuse.

1.4 QUALITY ASSURANCE

1.4.1 Drawing Requirements

1.4.1.1 Luminaire Drawings

Include dimensions, effective projected area (EPA), accessories, and installation and construction details. Photometric data, including zonal lumen data, average and minimum ratio, aiming diagram, and candlepower distribution data shall accompany shop drawings.

1.4.1.2 Poles

Include dimensions, wind load determined in accordance with AASHTO LTS-4, pole deflection, pole class, and other applicable information.

1.4.2 Design Data for Luminaires

- a. Distribution data according to IESNA classification type as defined in IESNA HB-9.
- b. Amount of shielding on luminaires.

1.4.3 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

1.4.4 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

1.4.4.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.4.4.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Aluminum Poles

Do not store poles on ground. Support poles so they are at least one foot above ground level and growing vegetation. Do not remove factory-applied pole wrappings until just before installing pole.

1.6 SUSTAINABLE DESIGN REQUIREMENTS

1.6.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources.

1.6.2 Energy Efficiency

Comply with National Energy Policy Act and Energy Star requirements for lighting products. Submit documentation for Energy Star qualifications for equipment provided under this section. Submit data indicating lumens per watt efficiency and color rendition index of light source.

1.7 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.8 OPERATIONAL SERVICE

Coordinate with manufacturer for take-back program. Collect information from the manufacturer and submit to Contracting Officer. Services shall reclaim materials for recycling and/or reuse. Services shall not landfill or burn reclaimed materials. Indicate procedures for compliance with regulations governing disposal of mercury. When such a service is not available, local recyclers shall be sought after to reclaim the materials.

PART 2 PRODUCTS

2.1 LUMINAIRES

UL 1598. Provide luminaires as indicated. Provide luminaires complete with lamps of number, type, and wattage indicated. Details, shapes, and dimensions are indicative of the general type desired, but are not intended to restrict selection to luminaires of a particular manufacturer.

Luminaires of similar designs, light distribution and brightness characteristics, and of equal finish and quality will be acceptable as approved.

2.1.1.1 Lamps

2.1.1.1.1 High-Pressure Sodium (HPS) Lamps

NEMA ANSLG C78.42. Wattage as indicated. HPS lamps shall have average rated life of 16,000 hours (minimum) for 35 watt lamps and 24,000 hours (minimum) for all higher wattage lamps. 150 watt lamps, if required, shall be 55 volt lamps. Lamps shall have Luminaire Efficiency Ratings (LER) as follows:

a. Upward efficiency of 0%

1. 150-399 watts: minimum 58 LER for closed fixture; minimum 68 for open fixture
2. 400-999 watts: minimum 63 LER for closed fixture; minimum 84 for open fixture

b. Upward efficiency of 1%-10%

1. 150-399 watts: minimum 64 LER for closed fixture; minimum 63 for open fixture
2. 400-999 watts: minimum 82 LER for closed fixture; minimum 89 for open fixture
3. 1000+ watts: minimum 109 LER for open fixture

c. Upward efficiency of 11% to 20%

1. 150-399 watts: minimum 78 LER for open fixture
2. 400-999 watts: minimum 94 for open fixture

d. Upward efficiency greater than 20%

1. 150-399 watts: minimum 75 LER for closed fixture; minimum 77 for open fixture

2.1.1.1.2 Metal-Halide Lamps

Provide luminaires with tempered glass lens.

a. Single-ended, wattage as indicated, conforming to NEMA C78.43

Lamps shall have Luminaire Efficiency Ratings (LER) as follows:

a. Upward efficiency of 0%

1. 150-399 watts: minimum 41 LER for closed fixture
2. 400-999 watts: minimum 53 LER for closed fixture; minimum 59 for open fixture
3. 1000+ watts: minimum 77 LER for closed fixture

b. Upward efficiency of 1%-10%

1. 150-399 watts: minimum 56 LER for closed fixture
2. 400-999 watts: minimum 62 LER for closed fixture; minimum 64 for open fixture
3. 1000+ watts: minimum 88 LER for open fixture

c. Upward efficiency greater than 20%

1. 150-399 watts: minimum 62 LER for closed fixture; minimum 77 for open fixture
2. 400-999 watts: minimum 65 LER for closed fixture

2.1.2 Ballasts for High-Intensity-Discharge (HID) Luminaires

UL 1029 and NEMA C82.4, and shall be constant wattage autotransformer (CWA) or regulator, high power-factor type (minimum 90%). Provide single-lamp ballasts which shall have a minimum starting temperature of minus 30 degrees C. Ballasts shall be:

- a. Designed to operate on voltage system to which they are connected.
- b. Constructed so that open circuit operation will not reduce the average life.

HID ballasts shall have a solid-state igniter/starter with an average life in the pulsing mode of 10,000 hours at the intended ambient temperature. Igniter case temperature shall not exceed 90 degrees C.

2.2 LIGHTING CONTACTOR

NEMA ICS 2, mechanically held contactor. Contacts shall be rated 600 volts, 20 amperes, and 4 poles. Rate contactor as indicated. Provide in NEMA 3R enclosure conforming to NEMA ICS 6. Contactor shall have silver alloy double-break contacts and coil clearing contacts for mechanically held contactor and shall require no arcing contacts. Provide contactor with hand-off-automatic selector switch.

2.3 TIME SWITCH

Astronomic dial type or electronic type, arranged to turn "ON" at sunset, and turn "OFF" at predetermined time between 8:30 p.m. and 2:30 a.m. or sunrise, automatically changing the settings each day in accordance with seasonal changes of sunset and sunrise. Provide switch rated 277 volts, having automatically wound spring mechanism or capacitor, to maintain accurate time for a minimum of 7 hours following power failure. Provide time switch with a manual on-off bypass switch. Housing for the time switch shall be surface mounted, NEMA 1 enclosure conforming to NEMA ICS 6.

2.4 PHOTOCELL SWITCH

UL 773 or UL 773A, hermetically sealed cadmium-sulfide or silicon diode type cell rated 277 volts ac, 60 Hz with single pole double-throw (spdt) contacts for mechanically held contactors rated 1000 watts designed to fail to the ON position. Switch shall turn on at or below 3 footcandles and off

at 4 to 10 footcandles. A time delay shall prevent accidental switching from transient light sources. Provide a directional lens in front of the cell to prevent fixed light sources from creating a turnoff condition. Provide switch:

- a. In a cast weatherproof aluminum housing with adjustable window slide, rated 1800 VA, minimum.

2.5 POLES

Provide poles designed for wind loading of 100 miles per hour determined in accordance with AASHTO LTS-4 while supporting luminaires and all other appurtenances indicated. The effective projected areas of luminaires and appurtenances used in calculations shall be specific for the actual products provided on each pole. Poles shall be anchor-base type designed for use with underground supply conductors. Poles shall have oval-shaped handhole having a minimum clear opening of 2.5 by 5 inches. Handhole cover shall be secured by stainless steel captive screws. Metal poles shall have an internal grounding connection accessible from the handhole near the bottom of each pole. Scratched, stained, chipped, or dented poles shall not be installed.

2.5.1 Aluminum Poles

Provide aluminum poles manufactured of corrosion resistant aluminum alloys conforming to AASHTO LTS-4 for Alloy 6063-T6 or Alloy 6005-T5 for wrought alloys and Alloy 356-T4 (3,5) for cast alloys. Poles shall be seamless extruded or spun seamless type with minimum 0.188 inch wall thickness. Provide a pole grounding connection designed to prevent electrolysis when used with copper ground wire. Tops of shafts shall be fitted with a round or tapered cover. Base shall be anchor bolt mounted, made of cast 356-T6 aluminum alloy in accordance with ASTM B 108 and shall be machined to receive the lower end of shaft. Joint between shaft and base shall be welded. Base cover shall be cast 356-T6 aluminum alloy in accordance with ASTM B 108. Hardware, except anchor bolts, shall be either 2024-T4 anodized aluminum alloy or stainless steel. Aluminum poles and brackets for roadway lighting shall have a uniform finish to match fixtures and shall not be painted. Manufacturer's standard provision shall be made for protecting the finish during shipment and installation. Minimum protection shall consist of spirally wrapping each pole shaft with protective paper secured with tape, and shipping small parts in boxes.

2.6 BRACKETS AND SUPPORTS

NEMA C136.3, NEMA C136.13, and ANSI C136.21, as applicable. Pole brackets shall be not less than 1 1/4 inch aluminum secured to pole. Slip-fitter or pipe-threaded brackets may be used, but brackets shall be coordinated to luminaires provided, and brackets for use with one type of luminaire shall be identical. Brackets for pole-mounted street lights shall correctly position luminaire no lower than mounting height indicated. Mount brackets not less than 24 feet above street. Special mountings or brackets shall be as indicated and shall be of metal which will not promote galvanic reaction with luminaire head.

2.7 POLE FOUNDATIONS

Anchor bolts shall be steel rod having a minimum yield strength of 50,000 psi; the top 12 inches of the rod shall be galvanized in accordance with ASTM A 153/A 153M.

2.8 EQUIPMENT IDENTIFICATION

2.8.1 Manufacturer's Nameplate

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

2.8.2 Labels

Provide labeled luminaires in accordance with UL 1598 requirements. Luminaires shall be clearly marked for operation of specific lamps and ballasts according to proper lamp type. The following lamp characteristics shall be noted in the format "Use Only _____":

- a. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
- b. ANSI ballast type (M98, M57, etc.) for HID luminaires.
- c. Correlated color temperature (CCT) and color rendering index (CRI) for all luminaires.

Markings related to lamp type shall be clear and located to be readily visible to service personnel, but unseen from normal viewing angles when lamps are in place. Ballasts shall have clear markings indicating multi-level outputs and indicate proper terminals for the various outputs.

2.9 FACTORY APPLIED FINISH

Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test.

PART 3 EXECUTION

3.1 INSTALLATION

Electrical installations shall conform to IEEE C2, NFPA 70, and to the requirements specified herein.

3.1.1 Aluminum Poles

Provide pole foundations with galvanized steel anchor bolts, threaded at the top end and bent 90 degrees at the bottom end. Provide ornamental covers to match pole and galvanized nuts and washers for anchor bolts. Concrete for anchor bases, polyvinyl chloride (PVC) conduit ells, and ground rods shall be as specified in Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE. Thoroughly compact backfill with compacting arranged to prevent pressure between conductor, jacket, or sheath and the end of conduit ell. Adjust poles as necessary to provide a permanent vertical position with the bracket arm in proper position for luminaire location. After installation, paint exposed surfaces of steel poles with two finish coats of aluminum paint.

3.1.2 Pole Setting

Depth shall be as indicated. Poles in straight runs shall be in a straight line. Dig holes large enough to permit the proper use of tampers to the full depth of the hole. Place backfill in the hole in 6 inch maximum layers and thoroughly tamp. Place surplus earth around the pole in a conical shape and pack tightly to drain water away.

3.1.3 Photocell Switch Aiming

Aim switch according to manufacturer's recommendations. Set adjustable window slide for 3 footcandles photocell turn-on.

3.1.4 GROUNDING

Ground noncurrent-carrying parts of equipment including metal poles, luminaires, mounting arms, brackets, and metallic enclosures as specified in Section 33 71 02.00 20 UNDERGROUND TRANSMISSION AND DISTRIBUTION. Where copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable for this purpose.

3.1.5 FIELD APPLIED PAINTING

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria.

3.2 FIELD QUALITY CONTROL

Upon completion of installation, verify that equipment is properly installed, connected, and adjusted. Conduct an operating test to show that the equipment operates in accordance with the requirements of this section.

-- End of Section --

SECTION 31 00 00

EARTHWORK

08/08

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO T 180 (2001; R 2004) Moisture-Density Relations
of Soils Using a 4.54-kg (10-lb) Rammer
and an 457-mm (18-in) Drop

AASHTO T 224 (2001; R 2004) Correction for Coarse
Particles in the Soil Compaction Test

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C600 (2005) Installation of Ductile-Iron Water
Mains and Their Appurtenances

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2008; Errata 2009) Structural Welding
Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM C 136 (2006) Standard Test Method for Sieve
Analysis of Fine and Coarse Aggregates

ASTM D 1140 (2000; R 2006) Amount of Material in Soils
Finer than the No. 200 (75-micrometer)
Sieve

ASTM D 1556 (2007) Density and Unit Weight of Soil in
Place by the Sand-Cone Method

ASTM D 1557 (2009) Standard Test Methods for
Laboratory Compaction Characteristics of
Soil Using Modified Effort (56,000
ft-lbf/ft³) (2700 kN-m/m³)

ASTM D 1883 (2007) CBR (California Bearing Ratio) of
Laboratory-Compacted Soils

ASTM D 2167 (2008) Density and Unit Weight of Soil in
Place by the Rubber Balloon Method

ASTM D 2434 (1968; R 2006) Permeability of Granular
Soils (Constant Head)

ASTM D 2487	(2006) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2937	(2004) Density of Soil in Place by the Drive-Cylinder Method
ASTM D 422	(1963; R 2007) Particle-Size Analysis of Soils
ASTM D 4318	(2005) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 6938	(2008a) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D 698	(2007e1) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))

1.2 DEFINITIONS

1.2.1 Satisfactory Materials

Satisfactory materials comprise any materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP, SM, SW-SM, SC, SW-SC, SP-SM, SP-SC. Satisfactory materials for grading comprise stones less than 8 inches, except for fill material for pavements which comprise stones less than 3 inches in any dimension.

1.2.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; and material classified as satisfactory which contains root and other organic matter or frozen material. Notify the Contracting Officer when encountering any contaminated materials.

1.2.3 Cohesionless and Cohesive Materials

Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Perform testing, required for classifying materials, in accordance with ASTM D 4318, ASTM C 136, ASTM D 422, and ASTM D 1140.

1.2.4 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum density. Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, express the degree of compaction for material having more than 30

percent by weight of their particles retained on the 3/4 inch sieve as a percentage of the maximum density in accordance with AASHTO T 180 and corrected with AASHTO T 224. To maintain the same percentage of coarse material, use the "remove and replace" procedure as described in NOTE 8 of Paragraph 7.2 in AASHTO T 180.

1.2.5 Hard/Unyielding Materials

Hard/Unyielding materials comprise weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" with stones greater than 3 inch in any dimension or as defined by the pipe manufacturer, whichever is smaller. These materials usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

1.2.6 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 1/2 cubic yard in volume. Removal of hard material will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.

1.2.7 Unstable Material

Unstable material are too wet to properly support the utility pipe, conduit, or appurtenant structure.

1.2.8 Select Granular Material

1.2.8.1 General Requirements

Select granular material consist of materials classified as GW OR SW, by ASTM D 2487 where indicated. The liquid limit of such material must not exceed 25 percent when tested in accordance with ASTM D 4318. The plasticity index must not be greater than 6 percent when tested in accordance with ASTM D 4318, and not more than 35 percent by weight may be finer than No. 200 sieve when tested in accordance with ASTM D 1140. Provide a minimum coefficient of permeability of 0.002 feet per minute when tested in accordance with ASTM D 2434.

1.2.8.2 California Bearing Ratio Values

Bearing Ratio: At 0.1 inch penetration, provide a bearing ratio of 10 percent at 95 percent ASTM D 1557 maximum density as determined in accordance with ASTM D 1883 for a laboratory soaking period of not less than 4 days.

1.2.9 Initial Backfill Material

Initial backfill consists of select granular material or satisfactory materials free from rocks 3 inches or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer, whichever is smaller. When the pipe is coated or wrapped for corrosion protection, free the initial backfill material of stones larger than 1/2 inches in any

dimension or as recommended by the pipe manufacturer, whichever is smaller.

1.2.10 Expansive Soils

Expansive soils are defined as soils that have a plasticity index equal to or greater than 15 when tested in accordance with ASTM D 4318.

1.3 SYSTEM DESCRIPTION

1.3.1 Classification of Excavation

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

1.3.2 Blasting

Blasting will not be permitted.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Shoring; G
Blasting; G
Dust Control and Management Plan; G

SD-03 Product Data

Utilization of Excavated Materials; G
Shoulder Construction

Procedure and location for disposal of unused satisfactory material. Proposed source of borrow material. Notification of encountering rock in the project. Advance notice on the opening of excavation or borrow areas. Advance notice on shoulder construction for rigid pavements.

SD-06 Test Reports

Testing
Borrow Site Testing

Within 24 hours of conclusion of physical tests, 4 copies of test results, including calibration curves and results of calibration tests. Results of testing at the borrow site.

SD-07 Certificates

Testing

Qualifications of the Corps validated commercial testing laboratory or the Contractor's validated testing facilities.

PART 2 PRODUCTS

2.1 BURIED WARNING AND IDENTIFICATION TAPE

Provide metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Provide permanent color and printing, unaffected by moisture or soil.

Warning Tape Color Codes

Red:	Electric
Yellow:	Gas, Oil; Dangerous Materials
Orange:	Telephone and Other Communications
Blue:	Water Systems
Green:	Sewer Systems

2.1.1 Warning Tape for Metallic Piping

Provide acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.003 inch and a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

2.1.2 Detectable Warning Tape for Non-Metallic Piping

Provide polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.004 inch, and a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Manufacture tape with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.2 DETECTION WIRE FOR NON-METALLIC PIPING

Insulate a single strand, solid copper detection wire with a minimum of 12 AWG.

2.3 MATERIAL FOR RIP-RAP

Provide Bedding material, Grout, Filter fabric and rock conforming to the requirements indicated.

2.3.1 Bedding Material

Provide bedding material consisting of sand, gravel, or crushed rock, well graded, with a maximum particle size of 2 inch. Compose material of tough, durable particles. Allow fines passing the No. 200 standard sieve with a plasticity index less than six.

2.3.2 Grout

Provide durable grout composed of cement, water, an air-entraining admixture, and sand mixed in proportions of one part portland cement to two parts of sand, sufficient water to produce a workable mixture, and an amount of admixture which will entrain sufficient air, as determined by the Contracting Officer. Mix grout in a concrete mixer. Allow a sufficient mixing time to produce a mixture having a consistency permitting gravity flow into the interstices of the rip-rap with limited spading and brooming.

2.3.3 Rock

Provide rock fragments sufficiently durable to ensure permanence in the structure and the environment in which it is to be used. Use rock fragments free from cracks, seams, and other defects that would increase the risk of deterioration from natural causes. Provide fragments sized so that no individual fragment exceeds a weight of 50 pounds and that no more than 10 percent of the mixture, by weight, consists of fragments weighing 2 pounds or less each. Provide rock with a minimum specific gravity of 2.50. Do not permit the inclusion of more than trace 1 percent quantities of dirt, sand, clay, and rock fines.

PART 3 EXECUTION

3.1 GENERAL EXCAVATION

Perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Perform the grading in accordance with the typical sections shown and the tolerances specified in paragraph FINISHING. Transport satisfactory excavated materials and place in fill or embankment within the limits of the work. Excavate unsatisfactory materials encountered within the limits of the work below grade and replace with satisfactory materials as directed. Include such excavated material and the satisfactory material ordered as replacement in excavation. Dispose surplus satisfactory excavated material not required for fill or embankment in areas approved for surplus material storage or designated waste areas. Dispose unsatisfactory excavated material in designated waste or spoil areas. During construction, perform excavation and fill in a manner and sequence that will provide proper drainage at all times. Excavate material required for fill or embankment in excess of that produced by excavation within the grading limits from the borrow areas indicated or from other approved areas selected by the Contractor as specified.

3.1.1 Ditches, Gutters, and Channel Changes

Finish excavation of ditches, gutters, and channel changes by cutting accurately to the cross sections, grades, and elevations shown. Do not excavate ditches and gutters below grades shown. Backfill the excessive open ditch or gutter excavation with satisfactory, thoroughly compacted, material or with suitable stone or cobble to grades shown. Dispose excavated material as shown or as directed, except in no case allow material be deposited a maximum 4 feet from edge of a ditch. Maintain excavations free from detrimental quantities of leaves, brush, sticks, trash, and other debris until final acceptance of the work.

3.1.2 Drainage Structures

Make excavations to the lines, grades, and elevations shown, or as

directed. Provide trenches and foundation pits of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Clean rock or other hard foundation material of loose debris and cut to a firm, level, stepped, or serrated surface. Remove loose disintegrated rock and thin strata. Do not disturb the bottom of the excavation when concrete or masonry is to be placed in an excavated area. Do not excavate to the final grade level until just before the concrete or masonry is to be placed.

3.1.1.3 Drainage

Provide for the collection and disposal of surface and subsurface water encountered during construction. Completely drain construction site during periods of construction to keep soil materials sufficiently dry. Construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity and provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

3.1.1.4 Trench Excavation Requirements

Excavate the trench as recommended by the manufacturer of the pipe to be installed. Slope trench walls below the top of the pipe, or make vertical, and of such width as recommended in the manufacturer's printed installation manual. Provide vertical trench walls where no manufacturer's printed installation manual is available. Shore trench walls more than 5 feet high, cut back to a stable slope, or provide with equivalent means of protection for employees who may be exposed to moving ground or cave in. Shore vertical trench walls more than 5 feet high. Excavate trench walls which are cut back to at least the angle of repose of the soil. Give special attention to slopes which may be adversely affected by weather or moisture content. Do not exceed the trench width below the pipe top of 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inch inside diameter, and do not exceed 36 inch plus pipe outside diameter for sizes larger than 24 inch inside diameter. Where recommended trench widths are exceeded, provide redesign, stronger pipe, or special installation procedures by the Contractor. The Contractor is responsible for the cost of redesign, stronger pipe, or special installation procedures without any additional cost to the Government.

3.1.4.1 Bottom Preparation

Grade the bottoms of trenches accurately to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Excavate bell holes to the necessary size at each joint or coupling to eliminate point bearing. Remove stones of 3 inch or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, to avoid point bearing.

3.1.4.2 Removal of Unyielding Material

Where unyielding material is encountered in the bottom of the trench,

remove such material 6 inch below the required grade and replaced with suitable materials as provided in paragraph BACKFILLING AND COMPACTION.

3.1.4.3 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, remove such material to the depth directed and replace it to the proper grade with select granular material as provided in paragraph BACKFILLING AND COMPACTION. When removal of unstable material is required due to the Contractor's fault or neglect in performing the work, the Contractor is responsible for excavating the resulting material and replacing it without additional cost to the Government.

3.1.4.4 Excavation for Appurtenances

Provide excavation for manholes, catch-basins, inlets, or similar structures of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Clean rock of loose debris and cut to a firm surface either level, stepped, or serrated, as shown or as directed. Remove loose disintegrated rock and thin strata. Specify removal of unstable material. When concrete or masonry is to be placed in an excavated area, take special care not to disturb the bottom of the excavation. Do not excavate to the final grade level until just before the concrete or masonry is to be placed.

3.1.4.5 Jacking, Boring, and Tunneling

Unless otherwise indicated, provide excavation by open cut except that sections of a trench may be jacked, bored, or tunneled if, in the opinion of the Contracting Officer, the pipe, cable, or duct can be safely and properly installed and backfill can be properly compacted in such sections.

3.1.5 Underground Utilities

The Contractor is responsible for movement of construction machinery and equipment over pipes and utilities during construction. Perform work adjacent to non-Government utilities as indicated in accordance with procedures outlined by utility company. Excavation made with power-driven equipment is not permitted within two feet of known Government-owned utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Contracting Officer. Report damage to utility lines or subsurface construction immediately to the Contracting Officer.

3.1.6 Structural Excavation

Ensure that footing subgrades have been inspected and approved by the Contracting Officer prior to concrete placement.

3.2 SELECTION OF BORROW MATERIAL

Select borrow material to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Obtain borrow material from the borrow areas within the limits of the project site, selected by the Contractor or from approved private sources. Unless

otherwise provided in the contract, the Contractor is responsible for obtaining the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling from the owners. Borrow material from approved sources on Government-controlled land may be obtained without payment of royalties. Unless specifically provided, do not obtain borrow within the limits of the project site without prior written approval. Consider necessary clearing, grubbing, and satisfactory drainage of borrow pits and the disposal of debris thereon related operations to the borrow excavation.

3.3 OPENING AND DRAINAGE OF EXCAVATION AND BORROW PITS

Notify the Contracting Officer sufficiently in advance of the opening of any excavation or borrow pit to permit elevations and measurements of the undisturbed ground surface to be taken. Except as otherwise permitted, excavate borrow pits and other excavation areas providing adequate drainage. Transport overburden and other spoil material to designated spoil areas or otherwise dispose of as directed. Provide neatly trimmed and drained borrow pits after the excavation is completed. Ensure that excavation of any area, operation of borrow pits, or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

3.4 SHORING

3.4.1 General Requirements

Submit a Shoring and Sheet piling plan for approval 15 days prior to starting work. Submit drawings and calculations, certified by a registered professional engineer, describing the methods for shoring and sheet piling of excavations. Finish shoring, including sheet piling, and install as necessary to protect workmen, banks, adjacent paving, structures, and utilities. Remove shoring, bracing, and sheet piling as excavations are backfilled, in a manner to prevent caving.

3.5 GRADING AREAS

Where indicated, divide work into grading areas within which satisfactory excavated material will be placed in embankments, fills, and required backfills. Do not haul satisfactory material excavated in one grading area to another grading area except when so directed in writing. Place and grade stockpiles of satisfactory and wasted materials as specified. Keep stockpiles in a neat and well drained condition, giving due consideration to drainage at all times. Clear, grub, and seal by rubber-tired equipment, the ground surface at stockpile locations; separately stockpile excavated satisfactory and unsatisfactory materials. Protect stockpiles of satisfactory materials from contamination which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, remove and replace such material with satisfactory material from approved sources.

3.6 FINAL GRADE OF SURFACES TO SUPPORT CONCRETE

Do not excavate to final grade until just before concrete is to be placed. Only use excavation methods that will leave the foundation rock in a solid and unshattered condition. Roughen the level surfaces, and cut the sloped surfaces, as indicated, into rough steps or benches to provide a satisfactory bond. Protect shales from slaking and all surfaces from erosion resulting from ponding or water flow.

3.7 GROUND SURFACE PREPARATION

3.7.1 General Requirements

Remove and replace unsatisfactory material with satisfactory materials, as directed by the Contracting Officer, in surfaces to receive fill or in excavated areas. Scarify the surface to a depth of 8 inch before the fill is started. Plow, step, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that the fill material will bond with the existing material. When subgrades are less than the specified density, break up the ground surface to a minimum depth of 8 inch, pulverizing, and compacting to the specified density. When the subgrade is part fill and part excavation or natural ground, scarify the excavated or natural ground portion to a depth of 12 inch and compact it as specified for the adjacent fill.

3.7.2 Frozen Material

Do not place material on surfaces that are muddy, frozen, or contain frost. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Moisten material as necessary to plus or minus 2 percent of optimum moisture.

3.8 UTILIZATION OF EXCAVATED MATERIALS

Dispose unsatisfactory materials removing from excavations into designated waste disposal or spoil areas. Use satisfactory material removed from excavations, insofar as practicable, in the construction of fills, embankments, subgrades, shoulders, bedding (as backfill), and for similar purposes. Do not waste any satisfactory excavated material without specific written authorization. Dispose of satisfactory material, authorized to be wasted, in designated areas approved for surplus material storage or designated waste areas as directed. Clear and grub newly designated waste areas on Government-controlled land before disposal of waste material thereon. Stockpile and use coarse rock from excavations for constructing slopes or embankments adjacent to streams, or sides and bottoms of channels and for protecting against erosion. Do not dispose excavated material to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

3.9 BURIED TAPE AND DETECTION WIRE

3.9.1 Buried Warning and Identification Tape

Provide buried utility lines with utility identification tape. Bury tape 12 inch below finished grade; under pavements and slabs, bury tape 6 inch below top of subgrade.

3.9.2 Buried Detection Wire

Bury detection wire directly above non-metallic piping at a distance not to exceed 12 inch above the top of pipe. Extend the wire continuously and unbroken, from manhole to manhole. Terminate the ends of the wire inside the manholes at each end of the pipe, with a minimum of 3 feet of wire, coiled, remaining accessible in each manhole. Furnish insulated wire over it's entire length. Install wires at manholes between the top of the

corbel and the frame, and extend up through the chimney seal between the frame and the chimney seal.

3.10 BACKFILLING AND COMPACTION

Place backfill adjacent to any and all types of structures, and compact to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials, to prevent wedging action or eccentric loading upon or against the structure. Prepare ground surface on which backfill is to be placed as specified in paragraph GROUND SURFACE PREPARATION. Provide compaction requirements for backfill materials in conformance with the applicable portions of paragraphs GROUND SURFACE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.10.1 Trench Backfill

Backfill trenches to the grade shown. Backfill the trench to 2 feet above the top of pipe prior to performing the required pressure tests. Leave the joints and couplings uncovered during the pressure test. Do not backfill the trench until all specified tests are performed.

3.10.1.1 Replacement of Unyielding Material

Replace unyielding material removed from the bottom of the trench with select granular material or initial backfill material.

3.10.1.2 Replacement of Unstable Material

Replace unstable material removed from the bottom of the trench or excavation with select granular material placed in layers not exceeding 6 inch loose thickness.

3.10.1.3 Bedding and Initial Backfill

Place initial backfill material and compact it with approved tampers to a height of at least one foot above the utility pipe or conduit. Bring up the backfill evenly on both sides of the pipe for the full length of the pipe. Take care to ensure thorough compaction of the fill under the haunches of the pipe. Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Compact backfill to top of pipe to 95 percent of ASTM D 698 maximum density. Provide plastic piping with bedding to spring line of pipe. Provide materials as follows:

- a. Class I: Angular, 0.25 to 1.5 inch, graded stone.
- b. Class II: Coarse sands and gravels with maximum particle size of 1.5 inch, including various graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as specified in ASTM D 2487.
- c. Clean, coarse-grained sand classified as SW or SP by ASTM D 2487 for bedding and backfill as indicated.
- d. Clean, coarsely graded natural gravel, crushed stone or a combination thereof identified as having a classification of GW in

accordance with ASTM D 2487 for bedding as indicated. Do not exceed maximum particle size of 1.5 inch.

3.10.1.4 Final Backfill

Fill the remainder of the trench, except for special materials for roadways with satisfactory material. Place backfill material and compact as follows:

- a. Roadways, : Place backfill up to the required elevation as specified. Do not permit water flooding or jetting methods of compaction.
- b. Sidewalks, Turfed or Seeded Areas and Miscellaneous Areas: Deposit backfill in layers of a maximum of 12 inch loose thickness, and compact it to 85 percent maximum density for cohesive soils and 90 percent maximum density for cohesionless soils. Do not permit compaction by water flooding or jetting. Apply this requirement to all other areas not specifically designated above.

3.10.2 Backfill for Appurtenances

After the manhole, catchbasin, inlet, or similar structure has been constructed and the concrete has been allowed to cure for 3 days, place backfill in such a manner that the structure is not be damaged by the shock of falling earth. Deposit the backfill material, compact it as specified for final backfill, and bring up the backfill evenly on all sides of the structure to prevent eccentric loading and excessive stress.

3.11 SPECIAL REQUIREMENTS

Special requirements for both excavation and backfill relating to the specific utilities are as follows:

3.11.1 Gas Distribution

Excavate trenches to a depth that will provide a minimum 18 inch of cover in rock excavation and a minimum 36 inch of cover in other excavation.

3.11.2 Water Lines

Excavate trenches to a depth that provides a minimum cover of 4 feet, or as indicated in plans, from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe. For fire protection yard mains or piping, provide minimum cover as indicated in plans.

3.11.3 Heat Distribution System

Free initial backfill material of stones larger than 1/4 inch in any dimension.

3.11.4 Electrical Distribution System

Provide a minimum cover of 24 inch from the finished grade to direct burial cable and conduit or duct line, unless otherwise indicated.

3.11.5 Pipeline Casing

Provide new smooth wall steel pipeline casing in locations indicated in the

drawings. Installation shall be in a trench unless otherwise indicated in the drawings. Provide each new pipeline casing, where indicated and to the lengths and dimensions shown, complete and suitable for use with the new piped utility as indicated. If installation by dry boring and jacking method is indicated, it shall be as follows:

3.11.5.1 Bore Holes

Mechanically bore holes and case through the soil with a cutting head on a continuous auger mounted inside the casing pipe. Weld lengths of pipe together in accordance with AWS D1.1/D1.1M. Do not use water or other fluids in connection with the boring operation.

3.11.5.2 Cleaning

Clean inside of the pipeline casing of dirt, weld splatters, and other foreign matter which would interfere with insertion of the piped utilities by attaching a pipe cleaning plug to the boring rig and passing it through the pipe.

3.11.5.3 End Seals

After installation of piped utilities in pipeline casing, provide watertight end seals at each end of pipeline casing between pipeline casing and piping utilities. Provide watertight end seals as indicated.

3.11.6 Rip-Rap Construction

Construct rip-rap on filter fabric in the areas indicated. Trim and dress indicated areas to conform to cross sections, lines and grades shown within a tolerance of 0.1 foot.

3.11.6.1 Bedding Placement

Spread filter fabric on prepared subgrade as indicated.

3.11.6.2 Stone Placement

Place rock for rip-rap on prepared bedding material to produce a well graded mass with the minimum practicable percentage of voids in conformance with lines and grades indicated. Distribute larger rock fragments, with dimensions extending the full depth of the rip-rap throughout the entire mass and eliminate "pockets" of small rock fragments. Rearrange individual pieces by mechanical equipment or by hand as necessary to obtain the distribution of fragment sizes specified above.

3.12 EMBANKMENTS

3.12.1 Earth Embankments

Construct earth embankments from satisfactory materials free of organic or frozen material and rocks with any dimension greater than 3 inches. Place the material in successive horizontal layers of loose material not more than 12 inch in depth. Spread each layer uniformly on a soil surface that has been moistened or aerated as necessary, and scarified or otherwise broken up so that the fill will bond with the surface on which it is placed. After spreading, plow, disk, or otherwise brake up each layer; moisten or aerate as necessary; thoroughly mix; and compact to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory

maximum density for cohesionless materials. Compaction requirements for the upper portion of earth embankments forming subgrade for pavements are identical with those requirements specified in paragraph SUBGRADE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.13 SUBGRADE PREPARATION

3.13.1 Proof Rolling

Finish proof rolling on an exposed subgrade free of surface water (wet conditions resulting from rainfall) which would promote degradation of an otherwise acceptable subgrade. After stripping, proof roll the existing subgrade with six passes of a 15 ton, pneumatic-tired roller. Operate the roller in a systematic manner to ensure the number of passes over all areas, and at speeds between 2-1/2 to 3-1/2 mph. When proof rolling, provide one-half of the passes made with the roller in a direction perpendicular to the other passes. Notify the Contracting Officer a minimum of 3 days prior to proof rolling. Perform proof rolling in the presence of the Contracting Officer. Undercut rutting or pumping of material to a depth of 12 inch and replace with fill and backfill material.

3.13.2 Construction

Shape subgrade to line, grade, and cross section, and compact as specified. Include plowing, disking, and any moistening or aerating required to obtain specified compaction for this operation. Remove soft or otherwise unsatisfactory material and replace with satisfactory excavated material or other approved material as directed. Excavate rock encountered in the cut section to a depth of 6 inch below finished grade for the subgrade. Bring up low areas resulting from removal of unsatisfactory material or excavation of rock to required grade with satisfactory materials, and shape the entire subgrade to line, grade, and cross section and compact as specified. After rolling, do not show deviations for the surface of the subgrade for roadways greater than 1/2 inch when tested with a 12-foot straightedge applied both parallel and at right angles to the centerline of the area. Do not vary the elevation of the finish subgrade more than 0.05 foot from the established grade and cross section.

3.13.3 Compaction

Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Except for paved areas, compact each layer of the embankment to at least 90 percent of laboratory maximum density.

3.13.3.1 Subgrade for Pavements

Compact subgrade for pavements to at least 95 percentage laboratory maximum density for the depth below the surface of the pavement shown. When more than one soil classification is present in the subgrade, thoroughly blend, reshape, and compact the top 6 inch of subgrade.

3.13.3.2 Subgrade for Shoulders

Compact subgrade for shoulders to at least 95 percentage laboratory maximum density for the depth below the surface of shoulder shown.

3.14 SHOULDER CONSTRUCTION

Construct shoulders of satisfactory excavated or borrow material or as otherwise shown or specified. Construct shoulders immediately after adjacent paving is complete. In the case of rigid pavements, do not construct shoulders until permission of the Contracting Officer has been obtained. Compact the entire shoulder area to at least the percentage of maximum density as specified in paragraph SUBGRADE PREPARATION above, for specific ranges of depth below the surface of the shoulder. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Finish shoulder construction in proper sequence in such a manner that adjacent ditches will be drained effectively and that no damage of any kind is done to the adjacent completed pavement. Align the completed shoulders true to grade and shaped to drain in conformity with the cross section shown.

3.15 FINISHING

Finish the surface of excavations, embankments, and subgrades to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. Provide the degree of finish for graded areas within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades specified in paragraph SUBGRADE PREPARATION. Finish gutters and ditches in a manner that will result in effective drainage. Repair graded, topsoiled, or backfilled areas prior to acceptance of the work, and re-established grades to the required elevations and slopes.

3.15.1 Subgrade and Embankments

During construction, keep embankments and excavations shaped and drained. Maintain ditches and drains along subgrade to drain effectively at all times. Do not disturb the finished subgrade by traffic or other operation. Protect and maintain the finished subgrade in a satisfactory condition until subbase, base, or pavement is placed. Do not permit the storage or stockpiling of materials on the finished subgrade. Do not lay subbase, base course, or pavement until the subgrade has been checked and approved, and in no case place subbase, base, surfacing, or pavement on a muddy, spongy, or frozen subgrade.

3.15.2 Grading Around Structures

Construct areas within 5 feet outside of each building and structure line true-to-grade, shape to drain, and maintain free of trash and debris until final inspection has been completed and the work has been accepted.

3.16 TESTING

Perform testing by a Corps validated commercial testing laboratory or the Contractor's validated testing facility. If the Contractor elects to establish testing facilities, do not permit work requiring testing until the Contractor's facilities have been inspected, Corps validated and approved by the Contracting Officer. Determine field in-place density in accordance with ASTM D 1556 or ASTM D 2167 ASTM D 6938 Procedure A. When ASTM D 6938 is used, check the calibration curves and adjust using only the sand cone method as described in ASTM D 1556. ASTM D 6938 results in a wet unit weight of soil in determining the moisture content of the soil when using this method. Check the calibration curves furnished with the moisture gauges along with density calibration checks as described in

ASTM D 6938 Procedure A; check the calibration of both the density and moisture gauges at the beginning of a job on each different type of material encountered and at intervals as directed by the Contracting Officer. ASTM D 2937, use the Drive Cylinder Method only for soft, fine-grained, cohesive soils. When test results indicate, as determined by the Contracting Officer, that compaction is not as specified, remove the material, replace and recompact to meet specification requirements. Perform tests on recompact areas to determine conformance with specification requirements. Appoint a registered professional civil engineer to certify inspections and test results. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

3.16.1 Fill and Backfill Material Gradation

One test per 750 cubic yards stockpiled or in-place source material. Determine gradation of fill and backfill material in accordance with ASTM C 136.

3.16.2 In-Place Densities

- a. One test per 5100 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.
- b. One test per 1000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.
- c. One test per 200 linear feet, or fraction thereof, of each lift of embankment or backfill for roads and utilities.

3.16.3 Check Tests on In-Place Densities

If ASTM D 6938 Procedure A is used, check in-place densities by ASTM D 1556 as follows:

- a. One check test per lift at the beginning and then weekly for each type of material being tested for each lift of fill or backfill compacted by other than hand-operated machines.
- b. One check test per lift for each 2500 square feet, of fill or backfill areas compacted by hand-operated machines.
- c. One check test per lift for each 10,000 linear feet, or fraction thereof, of embankment or backfill for roads.

3.16.4 Moisture Contents

In the stockpile, excavation, or borrow areas, perform a minimum of two tests per day per type of material or source of material being placed during stable weather conditions. During unstable weather, perform tests as dictated by local conditions and approved by the Contracting Officer.

3.16.5 Optimum Moisture and Laboratory Maximum Density

Perform tests for each type material or source of material including borrow material to determine the optimum moisture and laboratory maximum density

values. One representative test per 750 cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density.

3.16.6 Tolerance Tests for Subgrades

Perform continuous checks on the degree of finish specified in paragraph SUBGRADE PREPARATION during construction of the subgrades.

3.16.7 Displacement of Sewers

After other required tests have been performed and the trench backfill compacted to 2, feet above the top of the pipe, the finished grade surface, inspect the pipe to determine whether significant displacement has occurred. Conduct this inspection in the presence of the Contracting Officer. Inspect pipe sizes larger than 36 inch, while inspecting smaller diameter pipe by shining a light or laser between manholes or manhole locations, or by the use of television cameras passed through the pipe. If, in the judgement of the Contracting Officer, the interior of the pipe shows poor alignment or any other defects that would cause improper functioning of the system, replace or repair the defects as directed at no additional cost to the Government.

3.17 DISPOSITION OF SURPLUS MATERIAL

Provide surplus material or other soil material not required or suitable for filling or backfilling, and brush, refuse, stumps, roots, and timber as wasted in Government disposal area indicated as directed by the Contracting Officer.

-- End of Section --

SECTION 31 05 22

GEOTEXTILES USED AS FILTERS

08/08

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 123	(2007) Terminology Relating to Textiles
ASTM D 4355	(2007) Deterioration of Geotextiles from Exposure to Light, Moisture and Heat in a Xenon-Arc Type Apparatus
ASTM D 4491	(1999a; R 2004e1) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(2004) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(2008) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(2004) Determining Apparent Opening Size of a Geotextile
ASTM D 4833	(2007) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4873	(2002) Identification, Storage, and Handling of Geosynthetic Rolls and Samples
ASTM D 4884	(1996; R 2003) Strength of Sewn or Thermally Bonded Seams of Geotextiles

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 1110-2-1601	(1994; Change 1) Hydraulic Design of Flood Control Channels
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1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-04 Samples

Geotextile

Geotextile samples for testing, if requested, to determine compliance with the requirements in this specification, a minimum of 60 days prior to the beginning of installation of the same textile. Upon delivery of the geotextile, submit duplicate copies of the written certificate of compliance signed by a legally authorized official of the manufacturer. The certificate shall state that the geotextile shipped to the site meets the chemical requirements and exceeds the minimum average roll value listed in TABLE 1. Upon request, supply quality control and quality assurance tests for the geotextile. Provide all samples from the same production lot as will be supplied for the contract, of the full manufactured width of the geotextile by at least 10 feet long, except that samples for seam strength may be a full width sample folded over and the edges stitched for a length of at least 5 feet. Samples submitted for testing shall be identified by manufacturers lot designation. For needle punched geotextile, the manufacturer shall certify that the geotextile has been inspected using permanent on-line metal detectors and does not contain any needles.

SD-07 Certificates

Geotextile

Manufacturer's certification of the geotextile material. All brands of geotextile and all seams to be used will be accepted on the basis of mill certificates or affidavits. Submit duplicate copies of the mill certificate or affidavit signed by a legally authorized official from the company manufacturing the geotextile. The mill certificate or affidavit shall attest that the geotextile meets the chemical, physical and manufacturing requirements stated in this specification.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver only approved geotextile rolls to the project site. All geotextile shall be labeled, shipped, stored, and handled in accordance with ASTM D 4873. No hooks, tongs, or other sharp instruments shall be used for handling geotextile.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Geotextile

2.1.1.1 General

Provide geotextile that is a non-woven pervious sheet of plastic yarn as defined by ASTM D 123 matching or exceeding the minimum average roll values listed in TABLE 1. Strength values indicated in the table are for the weaker principal direction.

TABLE 1
MINIMUM PHYSICAL REQUIREMENTS FOR DRAINAGE GEOTEXTILE

TABLE 1

MINIMUM PHYSICAL REQUIREMENTS FOR DRAINAGE GEOTEXTILE			
PROPERTY	UNITS	ACCEPTABLE VALUES	TEST METHOD
GRAB STRENGTH	lb	200	ASTM D 4632
SEAM STRENGTH	lb	180	ASTM D 4632
PUNCTURE	lb	80	ASTM D 4833
TRAPEZOID TEAR	lb	40	ASTM D 4533
PERMEABILITY	cm/sec		ASTM D 4491
APPARENT OPENING SIZE	U.S. SIEVE	120	ASTM D 4751
PERMITTIVITY	sec ⁻¹		ASTM D 4491
ULTRAVIOLET DEGRADATION	Percent	50 AT 500 Hrs	ASTM D 4355

2.1.1.2 Geotextile Fiber

Fibers used in the manufacturing of the geotextile shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of polyolefins, polyesters, or polamides. Add stabilizers and/or inhibitors to the base polymer, if necessary to make the filaments resistant to deterioration caused by ultraviolet light and heat exposure. Reclaimed or recycled fibers or polymer shall not be added to the formulation. Geotextile shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including the edges. Finish the edges of the geotextile to prevent the outer fiber from pulling away from the geotextile.

2.1.2 Seams

Sew the seams of the geotextile with thread of a material meeting the chemical requirements given above for geotextile yarn or bond the seams by cementing or by heat. Attach the sheets of geotextile at the factory or another approved location, if necessary, to form sections not less than 12 feet wide. Test seams in accordance with method ASTM D 4884. The strength of the seam shall be not less than 90 percent of the required grab tensile strength of the unaged geotextile in any principal direction.

2.1.3 Securing Pins

Secure the geotextile to the embankment or foundation soil by pins to prevent movement prior to placement of revetment materials. Other appropriate means to prevent movement such as staples, sand bags, and stone could also be used. Insert securing pins through both strips of overlapped geotextile along the line passing through midpoints of the overlap. Remove securing pins as placement of revetment materials are placed to prevent tearing of geotextile or enlarging holes. Maximum spacing between securing pins depends on the steepness of the embankment slope. The maximum pins spacing shall be equal to or less than the values listed in TABLE 2. When windy conditions prevail at the construction site, increase the number of pins upon the demand of the Contracting Officer. Anchor terminal ends of

the geotextile with key trench or apron at crest, toe of the slope and upstream and downstream limits of installation.

TABLE 2
MAXIMUM SPACING FOR SECURING PINS

EMBANKMENT	SPACING, feet
STEEPER THAN 1V ON 3H	2
1V ON 3H TO 1V ON 4H	3
FLATTER THAN 1V ON 4H	5

2.2 INSPECTIONS, VERIFICATIONS, AND TESTING

2.2.1 Manufacturing and Sampling

Geotextiles and factory seams shall meet the requirements specified in TABLE 1. Perform conformance testing in accordance with the manufacturers approved quality control manual.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Prepare surface, on which the geotextile will be placed, to a relatively smooth surface condition in accordance with the applicable portion of this specification and shall be free from obstruction, debris, depressions, erosion feature, or vegetation. Remove any irregularities so as to ensure continuous, intimate contact of the geotextile with all the surface. Any loose material, soft or low density pockets of material, shall be removed; erosion features such as rills, gullies etc. shall be graded out of the surface before geotextile placement.

3.2 INSTALLATION OF THE GEOTEXTILE

3.2.1 General

Place the geotextile in the manner and at the locations shown. At the time of installation, reject the geotextile if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation or storage.

3.2.2 Placement

Place the geotextile with the long dimension parallel to the centerline of the channel and laid smooth and free of tension, stress, folds, wrinkles, or creases. Place the strips to provide a minimum width of 12 inches of overlap for each joint. The placement procedure requires that the length of the geotextile be approximately 50 percent greater than the slope length. Adjust the actual length of the geotextile used based on initial installation experience. Temporary pinning of the geotextile to help hold it in place until the riprap is placed will be allowed. Remove the temporary pins as the riprap is placed to relieve high tensile stress which may occur during placement of material on the geotextile. Design protection of riprap shall be in compliance with EM 1110-2-1601. Perform

trimming in such a manner that the geotextile is not damaged in any way.

3.3 PROTECTION

Protect the geotextile at all times during construction from contamination by surface runoff; remove any geotextile so contaminated and replaced with uncontaminated geotextile. Replace any geotextile damaged during its installation or during placement of riprap at no cost to the Government. Schedule the work so that the covering of the geotextile with a layer of the specified material is accomplished within 7 calendar days after placement of the geotextile. Failure to comply shall require replacement of geotextile. Protect the geotextile from damage prior to and during the placement of riprap or other materials. This may be accomplished by limiting the height of drop to less than 1 foot, by placing a cushioning layer of sand or gravel on top of the geotextile before placing the material, or other methods deemed necessary. Care should be taken to ensure that the utilized cushioning materials will not impede the flow of water. Before placement of riprap or other materials, demonstrate that the placement technique will not cause damage to the geotextile. In no case shall any type of equipment be allowed on the unprotected geotextile.

3.4 PLACEMENT OF CUSHIONING MATERIAL

Perform placing of cushioning material in a manner to ensure intimate contact of the geotextile with the prepared surface and with the cushioning material. The placement shall also be performed in a manner that will not damage the geotextile including tear, puncture, or abrasion. On sloping surfaces place the cushioning material from the bottom of the slopes upward. During placement, the height of the drop of riprap material shall not be greater than 12 inches. Uncover any geotextile damaged beneath the cushioning material, as necessary, and replaced at no cost to the Government.

3.5 OVERLAPPING AND SEAMING

3.5.1 Overlapping

The overlap of geotextile rolls shall be 12 inches. Appropriate measures will be taken to ensure required overlap exists after cushion placement.

3.5.2 Sewn Seams

High strength thread should be used so that seam test conforms to ASTM D 4884. The thread shall meet the chemical, ultraviolet, and physical requirements of the geotextile, and the color shall be different from that of the geotextile. The seam strength shall be equal to the strength required for the geotextile in the direction across the seam. Overlapping J-type seams are preferable over prayer-type seams as the overlapping geotextile reduces the chance of openings to occur at the seam. Use double sewing, specially for field seams, to provide a safety factor against undetected missed stitches.

-- End of Section --

SECTION 31 11 00

CLEARING AND GRUBBING

08/08

PART 1 GENERAL

1.1 DELIVERY, STORAGE, AND HANDLING

Deliver materials to store at the site, and handle in a manner which will maintain the materials in their original manufactured or fabricated condition until ready for use.

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 Roads and Walks

Keep roads and walks free of dirt and debris at all times.

3.1.2 Trees, Shrubs, and Existing Facilities

Trees and vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction operations by the erection of barriers or by such other means as the circumstances require.

3.1.3 Utility Lines

Protect existing utility lines that are indicated to remain from damage. Notify the Contracting Officer immediately of damage to or an encounter with an unknown existing utility line. The Contractor shall be responsible for the repairs of damage to existing utility lines that are indicated or made known to the Contractor prior to start of clearing and grubbing operations. When utility lines which are to be removed are encountered within the area of operations, notify the Contracting Officer in ample time to minimize interruption of the service.

3.2 CLEARING

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the areas to be cleared. Clearing shall also include the removal and disposal of structures that obstruct, encroach upon, or otherwise obstruct the work. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be removed completely, except such trees and vegetation as may be indicated or directed to be left standing. Trees designated to be left standing within the cleared areas shall be trimmed of dead branches 1-1/2 inches or more in diameter and shall be trimmed of all branches the heights indicated or directed. Limbs and branches to be trimmed shall be neatly cut close to the bole of the tree or main branches. Cuts more than 1-1/2 inches in diameter shall be painted with an approved tree-wound paint.

3.3 GRUBBING

Grubbing shall consist of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas. Material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, shall be removed to a depth of not less than 18 inches below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this contract, such as areas for buildings, and areas to be paved. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground.

3.4 DISPOSAL OF MATERIALS

Compliant with the mandate used by the office of the Fort Bliss Directorate of the Environment on the reduction and reuse of construction waste, all vegetation including trees, stumps, brush and shrubs is to be reduced and disposed of off site. Reduction of the vegetative matter will be chipping or shredding. -- End of Section --

SECTION 32 01 19

FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS
08/08

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 509	(2006) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM D 5893	(2004) Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements
ASTM D 6690	(2007) Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM D 789	(2007) Determination of Relative Viscosity and Moisture Content of Polyamide (PA)

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 525	(1989) Test Method for Evaluation of Hot-Applied Joint Sealants for Bubbling Due to Heating
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1.2 SYSTEM DESCRIPTION

Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started maintained in satisfactory condition at all times.

1.2.1 Joint Cleaning Equipment

1.2.1.1 Tractor-Mounted Routing Tool

Provide a routing tool, used for removing old sealant from the joints, of such shape and dimensions and so mounted on the tractor that it will not damage the sides of the joints. The tool shall be designed so that it can be adjusted to remove the old material to varying depths as required. The use of V-shaped tools or rotary impact routing devices will not be permitted. Hand-operated spindle routing devices may be used to clean and enlarge random cracks.

1.2.1.2 Concrete Saw

Provide a self-propelled power saw, with water-cooled diamond or abrasive saw blades, for cutting joints to the depths and widths specified or for refacing joints or cleaning sawed joints where sandblasting does not

provide a clean joint.

1.2.1.3 Sandblasting Equipment

Include with the sandblasting equipment an air compressor, hose, and long-wearing venturi-type nozzle of proper size, shape and opening. The maximum nozzle opening should not exceed 1/4 inch. The air compressor shall be portable and capable of furnishing not less than 150 cfm and maintaining a line pressure of not less than 90 psi at the nozzle while in use. Demonstrate compressor capability, under job conditions, before approval. The compressor shall be equipped with traps that will maintain the compressed air free of oil and water. The nozzle shall have an adjustable guide that will hold the nozzle aligned with the joint approximately 1 inch above the pavement surface. Adjust the height, angle of inclination and the size of the nozzle as necessary to secure satisfactory results.

1.2.1.4 Waterblasting Equipment

Include with the waterblasting equipment a trailer-mounted water tank, pumps, high-pressure hose, wand with safety release cutoff control, nozzle, and auxiliary water resupply equipment. Provide water tank and auxiliary resupply equipment of sufficient capacity to permit continuous operations. The nozzle shall have an adjustable guide that will hold the nozzle aligned with the joint approximately 1 inch above the pavement surface. Adjust the height, angle of inclination and the size of the nozzle as necessary to obtain satisfactory results. A pressure gauge mounted at the pump shall show at all times the pressure in psi at which the equipment is operating.

1.2.1.5 Hand Tools

Hand tools may be used, when approved, for removing defective sealant from a crack and repairing or cleaning the crack faces.

1.2.2 Sealing Equipment

1.2.2.1 Hot-Poured Sealing Equipment

The unit applicators used for heating and installing ASTM D 6690 joint sealant materials shall be mobile and shall be equipped with a double-boiler, agitator-type kettle with an oil medium in the outer space for heat transfer; a direct-connected pressure-type extruding device with a nozzle shaped for inserting in the joint to be filled; positive temperature devices for controlling the temperature of the transfer oil and sealant; and a recording type thermometer for indicating the temperature of the sealant. The applicator unit shall be designed so that the sealant will circulate through the delivery hose and return to the inner kettle when not in use.

1.2.2.2 Cold-Applied, Single-Component Sealing Equipment

The equipment for installing ASTM D 5893 single component joint sealants shall consist of an extrusion pump, air compressor, following plate, hoses, and nozzle for transferring the sealant from the storage container into the joint opening. The dimension of the nozzle shall be such that the tip of the nozzle will extend into the joint to allow sealing from the bottom of the joint to the top. Maintain the initially approved equipment in good working condition, serviced in accordance with the supplier's instructions, and unaltered in any way without obtaining prior approval. Small hand-held

air-powered equipment (i.e., caulking guns) may be used for small applications.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Manufacturer's Recommendations; G.

Printed copies of manufacturer's recommendations, 21 days prior to use on the project, where installation procedures, or any part thereof, are required to be in accordance with those recommendations. Installation of the material will not be allowed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

Equipment.

List of proposed equipment to be used in performance of construction work including descriptive data, 21 days prior to use on the project.

SD-04 Samples

Materials; G.

Samples of the materials (sealant, primer if required, and backup material), in sufficient quantity for testing and approval 21 days prior to the beginning of work. No material will be allowed to be used until it has been approved.

1.4 QUALITY ASSURANCE

1.4.1 Safety

Do not place joint sealant within 25 feet of any liquid oxygen (LOX) equipment, LOX storage, or LOX piping. Thoroughly clean joints in this area and leave them unsealed.

1.4.2 Test Requirements

Test the joint sealant and backup or separating material for conformance with the referenced applicable material specification. Perform testing of the materials in an approved independent laboratory and submit certified copies of the test reports for approval 21 days prior to the use of the materials at the job site. Samples will be retained by the Government for possible future testing should the materials appear defective during or after application. Conformance with the requirements of the laboratory tests specified will not constitute final acceptance of the materials. Final acceptance will be based on the performance of the in-place materials.

1.5 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the job site for defects, unload, and store

them with a minimum of handling to avoid damage. Provide storage facilities at the job site for maintaining materials at the temperatures and conditions recommended by the manufacturer.

1.6 ENVIRONMENTAL REQUIREMENTS

The ambient air temperature and the pavement temperature within the joint wall shall be a minimum of 50 degrees F and rising at the time of application of the materials. Do not apply sealant if moisture is observed in the joint.

PART 2 PRODUCTS

2.1 SEALANTS

Materials for sealing cracks in the various paved areas indicated on the drawings shall be as follows:

Area	Sealing Material
All Other Areas	ASTM D 6690, Type II and COE CRD-C 525
Concrete Joints	ASTM D 5893

2.2 PRIMERS

When primers are recommended by the manufacturer of the sealant, use them in accordance with the recommendation of the manufacturer.

2.3 BACKUP MATERIALS

Provide backup material that is a compressible, nonshrinking, nonstaining, nonabsorbing material, nonreactive with the joint sealant. The material shall have a melting point at least 5 degrees F greater than the pouring temperature of the sealant being used when tested in accordance with ASTM D 789. The material shall have a water absorption of not more than 5 percent of the sample weight when tested in accordance with ASTM C 509. The backup material shall be 25 plus or minus 5 percent larger in diameter than the nominal width of the crack.

PART 3 EXECUTION

3.1 PREPARATION OF JOINTS

Immediately before the installation of the sealant, thoroughly clean the joints to remove all laitance, curing compound, filler, protrusions of hardened concrete, and old sealant from the sides and upper edges of the joint space to be sealed.

3.1.1 Sawing

3.1.1.1 Refacing of Random Cracks

Accomplish sawing of the cracks using a power-driven concrete saw as specified in paragraph EQUIPMENT. The saw blade shall be 6 inches or less in diameter to enable the saw to follow the trace of the crack. Stiffen the blade, as necessary, with suitable dummy (or used) blades or washers. Immediately following the sawing operation, thoroughly clean the crack

opening using a water jet to remove all saw cuttings and debris.

3.1.2 Sandblasting

The newly exposed concrete joint faces and the pavement surfaces extending a minimum of 1/2 inch from the joint edges shall be waterblasted clean. use a multiple-pass technique until the surfaces are free of dust, dirt, curing compound, filler, old sealant residue, or any foreign debris that might prevent the bonding of the sealant to the concrete. After final cleaning and immediately prior to sealing, blow out the joints with compressed air and leave them completely free of debris and water.

3.1.3 Back-Up Material

When the joint opening is of a greater depth than indicated for the sealant depth, plug or seal off the lower portion of the joint opening using a back-up material to prevent the entrance of the sealant below the specified depth. Take care to ensure that the backup material is placed at the specified depth and is not stretched or twisted during installation.

3.1.4 Rate of Progress of Joint Preparation

Limit the stages of joint preparation, which include sandblasting, air pressure cleaning and placing of the back-up material to only that lineal footage that can be sealed during the same day.

3.2 PREPARATION OF SEALANT

3.2.1 Hot-Poured Sealants

Sealants conforming to ASTM D 6690 shall not be heated in excess of the safe heating temperature recommended by the manufacturer as shown on the sealant containers. Withdraw and waste sealant that has been overheated or subjected to application temperatures for over 4 hours or that has remained in the applicator at the end of the day's operation.

3.2.2 Single-Component, Cold-Applied Sealants

Inspect the ASTM D 5893 sealant and containers prior to use. Reject any materials that contain water, hard caking of any separated constituents, nonreversible jell, or materials that are otherwise unsatisfactory. Settlement of constituents in a soft mass that can be readily and uniformly remixed in the field with simple tools will not be cause for rejection.

3.3 INSTALLATION OF SEALANT

3.3.1 Time of Application

Seal joints immediately following final cleaning of the joint walls and following the placement of the separating or backup material. Open joints, that cannot be sealed under the conditions specified, or when rain interrupts sealing operations shall be recleaned and allowed to dry prior to installing the sealant.

3.3.2 Sealing Joints

Immediately preceding, but not more than 50 feet ahead of the joint sealing operations, perform a final cleaning with compressed air. Fill the joints from the bottom up to 1/8 inch plus or minus 1/16 inch below the pavement

surface. Remove and discard excess or spilled sealant from the pavement by approved methods. Install the sealant in such a manner as to prevent the formation of voids and entrapped air. In no case shall gravity methods or pouring pots be used to install the sealant material. Traffic shall not be permitted over newly sealed pavement until authorized by the Contracting Officer. When a primer is recommended by the manufacturer, apply it evenly to the joint faces in accordance with the manufacturer's instructions. Check the joints frequently to ensure that the newly installed sealant is cured to a tack-free condition within the time specified.

3.4 INSPECTION

3.4.1 Joint Cleaning

Inspect joints during the cleaning process to correct improper equipment and cleaning techniques that damage the concrete pavement in any manner. Cleaned joints will be approved prior to installation of the separating or back-up material and joint sealant.

3.4.2 Joint Sealant Application Equipment

Inspect the application equipment to ensure conformance to temperature requirements and proper installation. Evidences of bubbling, improper installation, failure to cure or set will be cause to suspend operations until causes of the deficiencies are determined and corrected.

3.4.3 Joint Sealant

Inspect the joint sealant for proper rate of cure and set, bonding to the joint walls, cohesive separation within the sealant, reversion to liquid, entrapped air and voids. Sealants exhibiting any of these deficiencies at any time prior to the final acceptance of the project shall be removed from the joint, wasted, and replaced as specified herein at no additional cost to the Government.

3.5 CLEAN-UP

Upon completion of the project, remove all unused materials from the site and leave the pavement in a clean condition.

-- End of Section --

SECTION 32 05 33

LANDSCAPE ESTABLISHMENT

07/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 2103 (2008) Standard Specification for Polyethylene Film and Sheeting

TREE CARE INDUSTRY ASSOCIATION (TCIA)

TCIA Z133.1 (2006) American National Standard for Arboricultural Operations - Pruning, Repairing, Maintaining, and Removing Trees, and Cutting Brush - Safety Requirements

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED (2002; R 2005) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)

1.2 DEFINITIONS

1.2.1 Pesticide

Any substance or mixture of substances, including biological control agents, that may prevent, destroy, repel, or mitigate pests and are specifically labeled for use by the U.S. Environmental Protection Agency (EPA). Also, any substance used as a plant regulator, defoliant, disinfectant, or biocide. Examples of pesticides include fumigants, herbicides, insecticides, fungicides, nematocides, molluscicides and rodenticides.

1.2.2 Stand of Turf

95 percent ground cover of the established species.

1.2.3 Planter Beds

A planter bed is defined as an area containing one or a combination of the following plant types: shrubs, vines, wildflowers, annuals, perennials, ground cover, and a mulch topdressing excluding turf. Trees may also be found in planter beds.

1.3 RELATED REQUIREMENTS

Section 32 84 24 IRRIGATION SPRINKLER SYSTEM applies to this section for installation of irrigation equipment requirements, with additions and modifications herein.

Section 32 93 00 EXTERIOR PLANTS applies to this section for installation of trees, shrubs, ground cover, and wildflower, with additions and modifications herein.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Integrated Pest Management Plan; G

SD-03 Product Data

Local/Regional Materials; (LEED)

Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

Fertilizer; G

Hose; (LEED)

Mulches Topdressing; (LEED)

Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

Organic Mulch Materials

Submit documentation indicating type of biobased material in product and biobased content. Indicate relative dollar value of biobased content products to total dollar value of products included in project.

SD-07 Certificates

Maintenance inspection report

Plant quantities; G

SD-10 Operation and Maintenance Data

Maintenance

SD-11 Closeout Submittals

Tree, staking and guying removal

1.5 DELIVERY, STORAGE AND HANDLING

1.5.1 Delivery

Deliver fertilizer, iron, and compost to the site in original containers bearing manufacturer's chemical analysis, name, trade name, or trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer, may be furnished in bulk with a certificate indicating the above information.

1.5.2 Storage

1.5.2.1 Fertilizer, Iron, Mulch Storage

Material shall be stored in designated areas. Fertilizer shall be stored in cool, dry locations away from contaminants.

1.5.2.2 Antidessicants Storage

Do not store with fertilizers or other landscape maintenance materials.

1.5.3 Handling

Do not drop or dump materials from vehicles.

1.6 SUSTAINABLE DESIGN REQUIREMENTS

1.6.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources. Landscaping materials may be locally available.

PART 2 PRODUCTS

2.1 POST-PLANT FERTILIZER

2.1.1 Granular Fertilizer

Organic, granular controlled release fertilizer containing the following minimum percentages, by weight, of plant food nutrients:

- 11 percent available nitrogen
- 2 percent available phosphorus
- 3 percent available potassium
- .32 percent sulfur
- .35 percent iron

2.2 WATER

Source of water shall be approved by the Contracting Officer, and be of suitable quality for irrigation.

INDOOR AQUATICS CENTER - SITE INFRASTRUCTURE AND LANDSCAPE DESIGN

DP097

2.2.1 Hose

Hoses used for watering shall be a minimum of 60 percent post-consumer rubber or plastic.

2.3 MULCHES TOPDRESSING

Free from noxious weeds, mold, pesticides, or other deleterious materials.

2.3.1 Inert Mulch Materials

Decomposed granite ranging in size from 3/4" to sandy fines. Compacted in 1" lifts maximum and top raked smooth. Provide materials from site and construction waste to the greatest extent possible. Mulch may contain post-consumer or post-industrial recycled content.

2.3.2 Organic Mulch Materials

Shredded hardwood from site when available. Biobased content shall be a minimum of 100 percent. Wood cellulose fiber shall be processed to contain no growth or germination-inhibiting factors, dyed with non-toxic, biodegradable dye to an appropriate color to facilitate visual metering of materials application. Paper-based hydraulic mulch shall contain a minimum of 100 percent post-consumer recycled content. Wood-based hydraulic mulch shall contain a minimum of 100 percent recycled material.

2.4 PESTICIDES

Use black sheet polyethylene conforming to ASTM D 2103, minimum thickness 5/32 inch. Submit an Integrated Pest Management Plan, including proposed alternatives to herbicides and pesticides. Use biological pest controls as approved in the Plan.

PART 3 EXECUTION

3.1 EXTENT OF WORK

Provide landscape construction maintenance to include irrigation equipment cleaning and adjustments, overseeding, aeration, fertilizing, watering, weeding, pruning, stake and guy adjusting, for all newly installed landscape areas, unless indicated otherwise, and at all areas inside or outside the limits of the construction that are disturbed by the Contractor's operations.

3.1.1 Policing

The Contractor shall police all landscaped areas. Policing includes removal of leaves, branches and limbs regardless of length or diameter, dead vegetation, paper, trash, cigarette butts, garbage, rocks or other debris. Policing shall extend to both sides of fencing or walls. Collected debris shall be promptly removed and disposed of at an approved disposal site.

3.1.2 Drainage System Maintenance

The Contractor shall remove all obstructions from surface and subsurface drain lines to allow water to flow unrestricted in swales, gutters, catch basins, storm drain curb inlets, and yard drains. Remove grates and clear debris in catch basins. Open drainage channels are to be maintained free

of all debris and vegetation at all times. Edges of these channels shall be clear of any encroachment by vegetation.

3.2 IRRIGATION ESTABLISHMENT PERIOD

The irrigation establishment period will commence on the date that inspection by the Contracting Officer shows that the new irrigation equipment furnished under this contract have been satisfactorily installed and is functional and shall continue for a period of 365 days.

3.2.1 Maintenance During the Irrigation Establishment Period

Begin maintenance immediately after irrigation equipment has been installed and is functional. Inspect irrigation equipment at least once a week during the installation and establishment period and perform needed maintenance promptly. Automatic controllers not equipped with rain shut-off sensors shall be turned off during periods of rain that exceed twelve hours of continuous rainfall in one day or during rain storms of one day or more. Once the rain has subsided timers shall be reactivated. Irrigation controllers shall be inspected and reprogrammed after power outages. Contractor shall be responsible for winterization and startup. Sprinkler heads shall direct water away from buildings and hard surfaced areas.

3.2.2 Water Restrictions

The Contractor shall abide by state, local or other water conservation regulations in force during the establishment period. Automatic controller shall be adjusted to comply with the water conservation regulations schedule.

3.2.3 Fire Hydrants

To use a fire hydrant for irrigation, the Contractor shall obtain prior clearance from the Contracting Officer and provide the tools and connections approved for use on fire hydrants. If a fire hydrant is used, Contractor shall provide a reduced pressure backflow preventer for each connection between hose and fire hydrant. Backflow preventer used shall be tested once per month by a certified backflow preventer tester.

3.2.4 Final Acceptance

Operation and coverage test is acceptable if system operates through at least one complete cycle for areas to be irrigated and all leaks or repairs have been completed.

3.2.5 Controller Charts

Provide one chart for each controller supplied. Indicate in chart area controlled by the automatic controller. The chart is a reduction of the actual plan that will fit the maximum dimensions inside the controller housing. Use a black line print for the chart and a different pastel or transparent color to indicate each station zone of coverage. After chart is completed and approved for final acceptance, seal chart between two 20 mil pieces of clear plastic.

3.3 EXTERIOR PLANT ESTABLISHMENT PERIOD

The exterior plant establishment period will commence on the date that

inspection by the Contracting Officer shows that the new plants furnished under this contract have been satisfactorily installed and shall continue for a period of 365 days.

3.3.1 Frequency of Maintenance

Begin maintenance immediately after plants have been installed. Inspect exterior plants at least once a week during the installation and establishment period and perform needed maintenance promptly.

3.3.2 Promotion of Plant Growth and Vigor

Water, prune, fertilize, mulch, adjust stakes, guys and turnbuckles, eradicate weeds and perform other operations necessary to promote plant growth, and vigor.

3.3.3 Planter Bed Maintenance

Planter beds shall be weeded, fertilized, irrigated, kept pest free, turf free, pruned, and mulch levels maintained. Planter beds will not be allowed to encroach into turf areas. A definite break shall be maintained between turf areas and planter beds. Fertilize exterior planting materials to promote healthy plant growth without encouraging excessive top foliar growth. Remove noxious weeds common to the area from planting areas by mechanical means.

3.3.3.1 Shrub Selective Maintenance

In addition to the above requirements, shrubs shall be selectively pruned, and shaped for health and safety when the following conditions exist: Remove growth in front of windows, over entrance ways or walks, and any growth which will obstruct vision at street intersections or of security personnel; Remove dead, damaged or diseased branches or limbs; where shrub growth obstructs pedestrian walkways; where shrub growth is found growing against or over structures; where shrub growth permits concealment of unauthorized persons. All pruning debris shall be disposed of in a proper manner.

3.3.3.2 Tree Maintenance

Tree maintenance shall include adjustment of stakes, ties, guy supports and turnbuckles, watering, fertilizing, pest control, mulching, pruning for health and safety. Fertilize exterior trees to promote healthy plant growth without encouraging excessive top foliar growth. Stakes, ties, guy supports and turnbuckles shall be inspected and adjusted to avoid girdling and promote natural development. All trees within the project boundaries, regardless of caliper, shall be selectively pruned for safety and health reasons. These include but are not limited to removal of dead and broken branches and correction of structural defects. Prune trees according to their natural growth characteristics leaving trees well shaped and balanced. Pruning of all trees including palm trees shall be accomplished by or in the presence of a certified member of the International Society of Arboriculture and in accordance with TCIA Z133.1. All pruning debris generated shall be disposed of in a proper manner.

3.3.3.3 Natural Recovery Areas

Areas designated as natural recovery areas or stock pile areas shall follow the guidelines established by the Fort Bliss Army Installation Design Guide

for Fort Bliss, February 2006 edition, Section 6.13 Natural Recovery Areas; 6.13.1 to 6.13.8 and Section 10.5.2.4 Open Space Planting/ Natural Recovery Areas. Areas designated as natural recovery areas or stock pile areas shall establish a "Western Rangeland Grass Mix", Item #2806, distributed by Native American Seed (aka SeedSource), Junction, Texas. Info@seedsource.com. Planting rates are established at 7 lbs per acre. Contractor shall implement means to insure seed contact with the soil. Seed contact is established by light tractor tilling or raking. The seed mix should be planted to preferred depths of .25" to .50". Spread the seed evenly across the area and rake lightly to cover them. Firm the seedbed by rolling or packing the surface. Water the newly planted seeds lightly and frequently to prevent soil erosion and drying. Soil should stay in good moisture content for at least 3 weeks or until a 95%, 1" stand of grass is established. Contractor shall provide a regular watering schedule to the revegetation areas to promote seed germination, establishment, and growth of the rangeland grass mix. Watering may cease only after these provisions are met. Failure to establish the grass will require additional applications at no cost to the government. Two applications shall be administered 6 months apart.

Contractor shall employ irrigation means necessary to establish the stand of grasses. Acceptable means of irrigation include hand-watering, truck watering and temporary irrigation systems. The newly planted seeds should be watered lightly and frequently. The soil should be kept moist, but not soaked. Prevent the top of the soil from drying. When grasses have reached approximately 1" in height, decrease the frequency and increase the depth of watering to promote root growth; 1-2 inches every 10 days. Irrigation may be discontinued only after a stand of grass has been established and approved by the contracting officer.

3.3.4 Slope Erosion Control Maintenance

The Contractor shall provide slope erosion control maintenance to prevent undermining of all slopes in newly landscaped and natural growth areas. Maintenance tasks include immediate repairs to weak spots in sloped areas, and maintaining clean, clear culverts, and graded berms, and terraces to intercept and direct water flow to prevent development of large gullies and slope erosion and during periods of extended rainfall, irrigation systems shall be secured. Eroded areas shall be filled with amended topsoil and replanted with the same plant species. Erosion control netting, blankets damaged due to slope erosion shall be reinstalled.

3.3.5 Removal of Dying or Dead Plants

Remove dead and dying plants and provide new plants immediately upon commencement of the specified planting season, and replace stakes, guys, mulch and eroded earth mound water basins. No additional plant establishment period will be required for replacement plants beyond the original warranty period. A tree shall be considered dying or dead when the main leader has died back, or a minimum of 20 percent of the crown has died. A shrub or ground cover shall be considered dying or dead when a minimum of 20 percent of the plant has died. This condition shall be determined by scraping on a branch an area 1/16 inch square, maximum, to determine the cause for dying plant material and shall provide recommendations for replacement. The Contractor shall determine the cause for dying plant material and provide recommendations for replacement.

3.3.6 Tracking of Unhealthy Plants

Note plants not in healthy growing condition, as determined by the Contracting Officer, and as soon as seasonal conditions permit, remove and replace with plants of the same species and sizes as originally specified. Install replacement plantings in accordance with Section 32 93 00 EXTERIOR PLANTS.

3.3.7 Final Inspection

Final inspection will be made upon written request from the Contractor at least 10 days prior to the last day of the establishment period. Final inspection will be based upon satisfactory health and growth of plants and on the following:

3.3.7.1 Total Plants on Site

Plants have been accepted and required number of replacements have been installed.

3.3.7.2 Mulching and Weeding

Planter beds and earth mound water basins are properly mulched and free of weeds.

3.3.7.3 Tree Supports

Stakes guys and turnbuckles are in good condition.

3.3.7.4 Remedial Work

Remedial measures directed by the Contracting Officer to ensure plant material survival and promote healthy growth have been completed.

3.3.8 Unsatisfactory Work

When work is found to not meet design intent and specifications, maintenance period will be extended at no additional cost to the Government until work has been completed, inspected and accepted by Contracting Officer.

3.4 FIELD QUALITY CONTROL

3.4.1 Maintenance Inspection Report

Provide maintenance inspection report to assure that landscape maintenance is being performed in accordance with the specifications and in the best interest of plant growth and survivability. Site observations shall be documented at the start of the establishment period, then quarterly following the start, and at the end of establishment period. Results of site observation visits shall be submitted to the Contracting Officer within 7 calendar days of each site observation visit.

3.4.2 Plant Quantities

The Contractor shall provide Contracting Officer with the number of plant quantities. In addition, provide total exterior area of hardscape and landscaping such as turf and total number of shrubs.

3.4.3 Tree Staking and Guying Removal

The Contractor shall provide a certified letter that all stakes and guys are removed from all project trees at the end of the establishment period.

-- End of Section --

SECTION 32 11 16

BASE COURSE FOR RIGID AND SUBBASES FOR FLEXIBLE PAVING

08/08

PART 1 GENERAL

1.1 UNIT PRICES

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO T 180 (2001; R 2004) Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and an 457-mm (18-in) Drop

AASHTO T 224 (2001; R 2004) Correction for Coarse Particles in the Soil Compaction Test

ASTM INTERNATIONAL (ASTM)

ASTM C 117 (2004) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing

ASTM C 131 (2006) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

ASTM C 136 (2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

ASTM D 1556 (2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D 1557 (2009) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2700 kN-m/m³)

ASTM D 2167 (2008) Density and Unit Weight of Soil in Place by the Rubber Balloon Method

ASTM D 2487 (2006) Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D 4318 (2005) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D 6938 (2008a) Standard Test Method for In-Place

Density and Water Content of Soil and
Soil-Aggregate by Nuclear Methods (Shallow
Depth)

ASTM D 75 (2003) Standard Practice for Sampling
Aggregates

ASTM E 11 (2004) Wire Cloth and Sieves for Testing
Purposes

1.3 DEFINITION

Degree of compaction required is expressed as a percentage of the maximum laboratory dry density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum dry density. One exception is as follows: Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve will be expressed as a percentage of the laboratory maximum dry density in accordance with AASHTO T 180 Method D and corrected with AASHTO T 224.

1.4 SYSTEM DESCRIPTION

All plant, equipment, and tools used in the performance of the work will be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. Provide equipment which is adequate and has the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00
SUBMITTAL PROCEDURES:

SD-03 Product Data

Equipment

List of proposed equipment to be used in performance of construction work, including descriptive data.

Waybills and Delivery Tickets

Copies of waybills and delivery tickets during the progress of the work.

SD-06 Test Reports

Sampling and Testing Field Density Tests

Certified copies of test results for approval not less than 30 days before material is required for the work.

Calibration curves and related test results prior to using the

device or equipment being calibrated.

Copies of field test results within 24 hours after the tests are performed.

1.6 QUALITY ASSURANCE

Sampling and testing are the responsibility of the Contractor, to be performed by an approved testing laboratory in accordance with Section 01 45 00.00 10 QUALITY CONTROL. Perform tests at the specified frequency. No work requiring testing will be permitted until the testing laboratory has been inspected and approved. Test the materials to establish compliance with the specified requirements.

1.6.1 Sampling

Take samples for laboratory testing in conformance with ASTM D 75. When deemed necessary, the sampling will be observed by the Contracting Officer.

1.6.2 Tests

1.6.2.1 Sieve Analysis

Make sieve analysis in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11.

1.6.2.2 Liquid Limit and Plasticity Index

Determine liquid limit and plasticity index in accordance with ASTM D 4318.

1.6.2.3 Moisture-Density Determinations

Determine the laboratory maximum dry density and optimum moisture in accordance with AASHTO T 180, Method D and corrected with AASHTO T 224.

1.6.2.4 Field Density Tests

Measure field density in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 6938 Procedure A. For the method presented in ASTM D 1556, use the base plate, as shown in the ASTM drawing. For the method presented in ASTM D 6938, check and adjust the calibration curves, if necessary, using only the sand cone method as described in paragraph Calibration, of the ASTM publication. Tests performed in accordance with ASTM D 6938 result in a wet unit weight of soil and ASTM D 6938 will be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 6938 Procedure A. The calibration checks of both the density and moisture gauges shall be made by the prepared containers of material method, as described in paragraph Calibration, in ASTM D 6938, on each different type of material to be tested at the beginning of a job and at intervals as directed. Five percent of the density tests shall use the sand cone method.

1.6.2.5 Wear Test

Perform wear tests in conformance with ASTM C 131.

1.6.3 Testing Frequency

1.6.3.1 Initial Tests

Perform one of each of the following tests on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements prior to installation.

- a. Sieve Analysis
- b. Liquid limit and plasticity index
- c. Moisture-density relationship
- d. Wear

1.6.3.2 In-Place Tests

Perform one of each of the following tests on samples taken from the placed and compacted subbase and select-material subbase or rigid pavement base course. Samples shall be taken and tested at the rates indicated.

- a. Perform density tests on every lift of material placed and at a frequency of one set of tests for every 750 square yards, or portion thereof, of completed area.
- b. Perform sieve analysis on every lift of material placed and at a frequency of one sieve analysis for every 1000 square yards, or portion thereof, of material placed.
- c. Perform liquid limit and plasticity index tests at the same frequency as the sieve analysis.
- d. Measure the thickness of each course at intervals providing at least one measurement for each 750 square yards or part thereof. The thickness measurement shall be made by test holes, at least 3 inches in diameter through the course.

1.6.4 Approval of Material

Select the source of materials 30 days prior to the time the material will be required in the work. Tentative approval will be based on initial test results. Final approval of the materials will be based on tests for gradation, liquid limit, and plasticity index performed on samples taken from the completed and compacted course.

1.7 ENVIRONMENTAL REQUIREMENTS

Perform construction when the atmospheric temperature is above 35 degrees F. When the temperature falls below 35 degrees F, protect all completed areas by approved methods against detrimental effects of freezing. Correct completed areas damaged by freezing, rainfall, or other weather conditions to meet specified requirements.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Subbase Course

Provide aggregates consisting of crushed stone, gravel, sand, or other sound, durable, approved materials processed and blended or naturally

combined. Provide aggregates which are durable and sound, free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign material. Material retained on the No. 4 sieve shall have a percentage of wear not to exceed 50 percent after 500 revolutions when tested as specified in ASTM C 131. Aggregate shall be reasonably uniform in density and quality. Slag shall be an air-cooled, blast-furnace product having a dry weight of not less than 65 pcf. Aggregates shall have a maximum size of 2 inch and shall be within the limits specified as follows:

The portion of any blended component and of the completed course passing the No. 40 sieve shall be either nonplastic or shall have a liquid limit not greater than 25 and a plasticity index not greater than 5. The contractor shall be responsible for any additional blending of materials required to make the compacted subgrade have a plasticity index of 15 or less.

2.1.1.2 Select-Material Subbase Course

Provide materials consisting of selected soil or other materials from field excavation, stockpiles, or other sources and free from lumps and balls of clay and from organic and other objectionable matter. Not more than 25 percent by weight shall pass the No. 200 sieve. The portion of material passing the No. 40 sieve shall have a liquid limit less than 35 and a plasticity index less than 12. The maximum particle size shall not exceed 3 inches. The contractor shall be responsible for any additional blending of materials required to make the compacted subgrade have a plasticity index of 15 or less.

2.1.1.3 Rigid Pavement Base Course

Provide aggregates consisting of crushed stone, gravel, sand, or other sound, durable, approved materials processed and blended or naturally combined. Provide aggregates which are durable and sound, free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign material. Material retained on the No. 4 sieve shall have a percentage of wear not to exceed 50 percent after 500 revolutions when tested as specified in ASTM C 131. At least 50 percent by weight retained on each sieve shall have one freshly fractured face with the area at least equal to 75 percent of the smallest midsectional area of the piece. Aggregate shall be reasonably uniform in density and quality. Slag shall be an air-cooled, blast-furnace product having a dry weight of not less than 65 pcf. Aggregates shall have a maximum size of 2 inches and shall be within the limits specified as follows:

The portion of any blended component and of the completed course passing the No. 40 sieve shall be either nonplastic or shall have a liquid limit not greater than 25 and a plasticity index not greater than 8. The Contractor is responsible for any additional stability required to provide a working platform for construction equipment. If the Contractor can demonstrate with a test section that a material has adequate stability to support construction equipment, the fractured face requirement can be deleted, subject to the approval of the Contracting Officer.

PART 3 EXECUTION

3.1 OPERATION OF AGGREGATE SOURCES

Clearing, stripping and excavating are the responsibility of the Contractor. Operate the aggregate sources to produce the quantity and quality of materials meeting the specified requirements in the specified

time limit. Aggregate sources on private lands shall be conditioned in agreement with local laws and authorities.

3.2 STOCKPILING MATERIAL

Prior to stockpiling of material, clear and level storage sites. Stockpile all materials, including approved material available from excavation and grading, in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled areas designated by the Contracting Officer to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

3.3 PREPARATION OF UNDERLYING MATERIAL

Prior to constructing the subbase or select-material subbase or rigid pavement base course, clean the underlying course or subgrade of all foreign substances. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. Correct ruts, or soft yielding spots, in the underlying courses, subgrade areas having inadequate compaction, and deviations of the surface from the specified requirements, by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompact to specified density requirements. For cohesionless underlying courses or subgrades containing sands or gravels, as defined in ASTM D 2487, the surface shall be stabilized prior to placement of the overlying course. Accomplish stabilization by mixing the overlying course material into the underlying course, and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements for the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained in a satisfactory condition until the overlying course is placed.

3.4 GRADE CONTROL

The finished and completed course shall conform to the lines, grades, and cross sections shown. The lines, grades, and cross sections shown shall be maintained by means of line and grade stakes placed by the Contractor at the work site.

3.5 MIXING AND PLACING MATERIALS

Mix and place the materials to obtain uniformity of the material at the water content specified. Make such adjustments in mixing or placing procedures or in equipment as may be directed to obtain the true grades, to minimize segregation and degradation, to reduce or accelerate loss or increase of water, and to insure a satisfactory subbase course.

3.6 LAYER THICKNESS

The compacted thickness of the completed course shall be as indicated on drawings. When a compacted layer of 6 inches is specified, the material may be placed in a single layer; when a compacted thickness of more than 6 inches is required, no layer shall be thicker than 6 inches nor be thinner than 3 inches when compacted.

3.7 COMPACTION

Compact each layer of the material, as specified, with approved compaction equipment. Maintain water content during the compaction procedure to

within plus or minus 2 percent of optimum water content, as determined from laboratory tests, as specified in paragraph SAMPLING AND TESTING. In all places not accessible to the rollers, compact the mixture with hand-operated power tampers. Compaction of the rigid base course shall continue until each layer is compacted through the full depth to at least 95 percent of laboratory maximum density, or as indicated on drawings. Make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory subbase course. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.8 EDGES

Place approved material along the edges of the subbase and select-material subbase course in such quantity as will compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, at least a 1 foot width of the shoulder shall be rolled and compacted simultaneously with the rolling and compacting of each layer of the subbase course, as directed.

3.9 SMOOTHNESS TEST

The surface of the top layer shall show no deviations in excess of 3/8 inch when tested with a 12 foot straightedge. Take measurements in successive positions parallel to the centerline of the area to be paved. Measurements shall also be taken perpendicular to the centerline at 50 foot intervals. Correct deviations exceeding this amount by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

3.10 THICKNESS CONTROL

The completed thickness of the course(s) shall be in accordance with the thickness and grade indicated on the drawings. The completed course shall not be more than 1/2 inch deficient in thickness nor more than 1/2 inch above or below the established grade. Where any of these tolerances are exceeded, correct such areas by scarifying, adding new material of proper gradation or removing material, and compacting, as directed. Where the measured thickness is 1/2 inch or more thicker than shown, the course will be considered as conforming with the specified thickness requirements plus 1/2 inch. The average job thickness shall be the average of the job measurements as specified above but within 1/4 inch of the thickness shown.

3.11 MAINTENANCE

Maintain the completed course in a satisfactory condition until accepted.

-- End of Section --

SECTION 32 13 13.06

PORTLAND CEMENT CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES

08/08

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 214R	(2002) Recommended Practice for Evaluation of Strength Test Results of Concrete
ACI 301	(2005) Specifications for Structural Concrete
ACI 305R	(1999; Errata 2006) Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting

ASTM INTERNATIONAL (ASTM)

ASTM A 184/A 184M	(2006) Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 615/A 615M	(2009) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A 775/A 775M	(2006) Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A 966/A 966M	(2008) Standard Test Method for Magnetic Particle Examination of Steel Forgings Using Alternating Current
ASTM C 1077	(2009b) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1260	(2007) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C 143/C 143M	(2009) Standard Test Method for Slump of Hydraulic-Cement Concrete

ASTM C 150	(2007) Standard Specification for Portland Cement
ASTM C 171	(2007) Standard Specification for Sheet Materials for Curing Concrete
ASTM C 172	(2008) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C 231	(2009a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2006) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C 309	(2007) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 31/C 31M	(2009) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(2003) Standard Specification for Concrete Aggregates
ASTM C 39/C 39M	(2005e1e2) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C 494/C 494M	(2008a) Standard Specification for Chemical Admixtures for Concrete
ASTM C 595	(2008a) Standard Specification for Blended Hydraulic Cements
ASTM C 618	(2008a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C 78	(2009) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C 94/C 94M	(2009) Standard Specification for Ready-Mixed Concrete

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS L-C-530	(Rev C) Coating, Pipe, Thermoplastic Resin
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1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Curing materials

Admixtures

Dowel

Reinforcement

Submit a complete list of materials including type, brand and applicable reference specifications.

Cementitious Materials; (LEED)

Aggregate; (LEED)

Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

Local/Regional Materials; (LEED)

Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

SD-05 Design Data

Concrete mix design

Thirty days minimum prior to concrete placement, submit a mix design, with applicable tests, for each strength and type of concrete for approval. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, slag, and admixtures; and applicable reference specifications. Provide mix proportion data using at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required. Submittal shall clearly indicate where each mix design will be used when more than one mix design is submitted. Obtain acknowledgement of approvals prior to concrete placement. Submit a new mix design for each material source change.

SD-06 Test Reports

Aggregate tests

Concrete slump tests

Air content tests

Compressive strength tests

Cementitious materials

SD-07 Certificates

Ready-mixed concrete plant

Batch tickets

Cementitious materials

SD-11 Closeout Submittals

Local/Regional Materials; (LEED)

LEED documentation relative to local/regional materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Cementitious Materials; (LEED)

Aggregate; (LEED)

LEED documentation relative to recycled content credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.3 DELIVERY, STORAGE, AND HANDLING

ASTM C 94/C 94M.

1.4 QUALITY ASSURANCE

1.4.1 Ready-mixed Concrete Plant Certification

Provide documentation that the ready-mix plant is certified by the National Ready-Mix Concrete Association (NRMCA).

1.4.2 Required Information

Submit copies of laboratory test reports showing that the mix has been successfully tested to produce concrete with the properties specified and that mix will be suitable for the job conditions. The laboratory test reports shall include mill test and all other test for cementitious materials, aggregates, and admixtures. Provide maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Test reports shall be submitted along with the concrete mix design. Sampling and testing of materials, concrete mix design, sampling and testing in the field shall be performed by a commercial testing laboratory which conforms to ASTM C 1077. The laboratory shall be approved in writing by the Government.

1.4.3 Batch Tickets

ASTM C 94/C 94M. Submit mandatory batch ticket information for each load of ready-mixed concrete.

1.5 SUSTAINABLE DESIGN REQUIREMENTS

1.5.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources. Pavement materials may be locally available.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Cementitious Materials

Cement and pozzolan will be accepted on the basis of manufacturer's certification of compliance, accompanied by mill test reports showing that the material in each shipment meets the requirements of the specification under which it is furnished. Mill test reports shall be no more than 1 month old, prior to use in the work. No cementitious material shall be used until notice of acceptance has been given by the Contracting Officer. Cementitious material may be subjected to check testing by the Government from samples obtained at the mill, at transfer points, or at the project site. If tests prove that a cementitious material that has been delivered is unsatisfactory, it shall be promptly removed from the site of the work. Cementitious material that has not been used within 6 months after testing shall be retested at the Contractor's expense and shall be rejected if test results are not satisfactory.

2.1.1.1 Cement

ASTM C 150, Type I or II or V or ASTM C 595, Type IS, IP, or P with maximum alkali content of 0.60%. Cement certificate shall include test results in accordance with ASTM C 150, including equivalent alkalies indicated in the Supplementary Optional Chemical Requirements.

2.1.1.2 Fly Ash and Pozzolan

ASTM C 618, Type F, except that the maximum allowable loss on ignition shall be 6%, maximum available alkalies content shall be 1.5%, and maximum calcium oxide (CaO) content 8%. Fly ash certificates shall include test results in accordance with ASTM C 618, including available alkalies indicated in the Supplementary Optional Chemical Requirements.

2.1.2 Water

ASTM C 94/C 94M, fresh, clean, and potable.

2.1.3 Aggregate

Aggregate may contain post-consumer or post-industrial recycled content.

2.1.3.1 Alkali Reactivity Test

Aggregates to be used in all concrete shall be evaluated and tested by the Contractor for alkali-aggregate reactivity in accordance with ASTM C 1260. The types of aggregates shall be evaluated in a combination which matches the contractors' proposed mix design (including Class F fly ash), utilizing the modified version of ASTM C 1260. Test results of the combination shall

have a measured expansion of less than 0.08 percent at 16 days. Should the test data indicate an expansion of greater than 0.08%, the aggregate(s) shall be rejected and the contractor shall submit new aggregate sources for retesting or may submit additional test results incorporating Lithium Nitrate for consideration.

ASTM C 1260 shall be modified as follows to include one of the following options:

- a. Utilize the contractor's proposed low alkali Portland cement and Class F fly ash in combination for the test proportioning. The laboratory shall use the contractor's proposed percentage of cement and fly ash.
- b. Utilize the contractor's proposed low alkali Portland cement and ground granulated blast furnace (GGBF) slag in combination for the test proportioning. The laboratory shall use the contractor's proposed percentage of cement and GGBF.
- c. Utilize the contractor's proposed low alkali Portland cement and Class F fly ash and ground granulated blast furnace (GGBF) slag in combination for the test proportioning. The laboratory shall use the contractor's proposed percentage of cement, fly ash and GGBF.

2.1.3.2 Fine Aggregates

ASTM C 33.

2.1.3.3 Coarse Aggregates

ASTM C 33.

2.1.4 Admixtures

ASTM C 494/C 494M: Type A, water reducing; Type B, retarding; Type C, accelerating; Type D, water-reducing and retarding; and Type E, water-reducing and accelerating admixture. Do not use calcium chloride admixtures. Where not shown or specified, the use of admixtures is subject to written approval of the Contracting Officer.

ASTM C 260: Air-entraining.

2.1.5 Reinforcement

2.1.5.1 Dowel Bars

Bars shall conform to ASTM A 615/A 615M, Grade 60 for plain billet-steel bars of the size and length indicated. Remove all burrs and projections from the bars.

2.1.5.2 Coated Dowel Bars

Bars shall conform to ASTM A 615/A 615M, Grade 60 for plain billet-steel bars of the size and length indicated. Remove all burrs or projections from the dowel bars. Coating system shall conform to FS L-C-530, Type 2. Coat the bars with a double coat system or an epoxy coating system for resistance to penetration of oil and salt solutions. The systems shall be in accordance with manufacturer's recommendation for coatings which are not bondable to concrete. Bond the coating to the dowel bar to resist laps or

folds during movement of the joint. Coating thickness shall be 7 mils minimum and 20 mils maximum.

2.1.5.3 Tie Bars

Bars shall be billet or axle steel deformed bars and conform to ASTM A 615/A 615M or ASTM A 966/A 966M Grade 60. Epoxy coated in accordance with ASTM A 775/A 775M.

2.1.5.4 Reinforcement

Deformed steel bar mats shall conform to ASTM A 184/A 184M. Bar reinforcement shall conform to ASTM A 615/A 615M , Grade 60.

2.1.6 Curing Materials

2.1.6.1 White-Burlap-Polyethylene Sheet

ASTM C 171, 0.004 inch thick white opaque polyethylene bonded to 10 oz/linear yard (40 inch) wide burlap.

2.1.6.2 Liquid Membrane-Forming Compound

ASTM C 309, white pigmented, Type 2, Class B, free of paraffin or petroleum.

2.1.7 Joint Fillers and Sealants

Provide as specified in Section 32 01 19 FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS. New joints shall match existing alignment.

2.2 CONCRETE PAVEMENT

2.3 CONTRACTOR-FURNISHED MIX DESIGN

Contractor-furnished mix design concrete shall be designed in accordance with ACI 211.1 except as modified herein, and the mix design shall be as specified herein under paragraph entitled "Submittals." The concrete shall have a minimum compressive strength of 4000 pounds per square inch at 28 days. The concrete may be air entrained. If air entrainment is used the air content shall be 5.0 plus or minus 1.5 percent. Maximum size aggregate for slip forming shall be 1.5 inches. The minimum cementitious factor is 564 lbs per cubic yard and slump shall be 1 to 3 inches (or less when slip form is used).

If the cementitious material is not sufficient to produce concrete of the flexural strength required it shall be increased as necessary, without additional compensation under the contract. The cementitious factor shall be calculated using cement, Class F fly ash, and or GGBF slag. The mix shall use a cement replacement (by weight) of 25%-35% Class F fly ash, or 40%-50% GGBF slag, or a combination of the two. In the combination, each 5% of Class F fly ash shall be replaced by 8% GGBF slag.

PART 3 EXECUTION

3.1 FORMS

3.1.1 Construction

Construct forms to be removeable without damaging the concrete.

3.1.2 Coating

Before placing the concrete, coat the contact surfaces of forms except existing pavement sections where bonding is required, with a non-staining mineral oil, non-staining form coating compound, or two coats of nitro-cellulose lacquer. When using existing pavement as a form, clean existing concrete and then coat with asphalt emulsion bondbreaker before concrete is placed.

3.1.3 Grade and Alignment

Check and correct grade elevations and alignment of the forms immediately before placing the concrete.

3.2 REINFORCEMENT

3.2.1 Dowel Bars

Install bars accurately aligned, vertically and horizontally, at indicated locations and to the dimensions and tolerances indicated. Before installation thoroughly grease the sliding portion of each dowel. Dowels must remain in position during concrete placement and curing.

3.2.2 Coated Dowel Bars

Install bars, accurately aligned vertically and horizontally, at indicated locations and to the dimensions and tolerances indicated. Reject coatings which are perforated, cracked or otherwise damaged. While handling avoid scuffing or gouging of the coatings.

3.2.3 Tie Bars

Install bars, accurately aligned horizontally and vertically, at indicated locations. For slipform construction, insert bent tie bars by hand or other approved means.

3.2.4 Setting Slab Reinforcement

Reinforcement shall be positioned on suitable chairs prior to concrete placement. At expansion, contraction and construction joints, place the reinforcement as indicated. Reinforcement, when placed in concrete, shall be free of mud, oil, scale or other foreign materials. Place reinforcement accurately and wire securely. The laps at splices shall be 12 inches minimum and the distances from ends and sides of slabs and joints shall be as indicated.

3.3 MEASURING, MIXING, CONVEYING, AND PLACING CONCRETE

3.3.1 Measuring

ASTM C 94/C 94M.

3.3.2 Mixing

ASTM C 94/C 94M, except as modified herein. Begin mixing within 30 minutes after cement has been added to aggregates. When the air temperature is greater than 85 degrees F, reduce mixing time and place concrete within 60 minutes. Additional water may be added to bring slump within required

limits as specified in Section 11.7 of ASTM C 94/C 94M, provided that the specified water-cement ratio is not exceeded.

3.3.3 Conveying

ASTM C 94/C 94M.

3.3.4 Placing

Follow guidance of ACI 301, except as modified herein. Do not exceed a free vertical drop of 3 feet from the point of discharge. Place concrete continuously at a uniform rate, with minimum amount of segregation, without damage to the grade and without unscheduled stops except for equipment failure or other emergencies. If this occurs within 10 feet of a previously placed expansion joint, remove concrete back to joint, repair any damage to grade, install a construction joint and continue placing concrete only after cause of the stop has been corrected.

3.3.5 Vibration

Immediately after spreading concrete, consolidate concrete with internal type vibrating equipment along the boundaries of all slabs regardless of slab thickness, and interior of all concrete slabs 6 inches or more in thickness. Limit duration of vibration to that necessary to produce consolidation of concrete. Excessive vibration will not be permitted. Vibrators shall not be operated in concrete at one location for more than 15 seconds. At the option of the Contractor, vibrating equipment of a type approved by the Contracting Officer may be used to consolidate concrete in unreinforced pavement slabs less than 6 inches thick.

3.3.5.1 Vibrating Equipment

Operate equipment, except hand-manipulated equipment, ahead of the finishing machine. Select the number of vibrating units and power of each unit to properly consolidate the concrete. Mount units on a frame that is capable of vertical movement and, when necessary, radial movement, so vibrators may be operated at any desired depth within the slab or be completely withdrawn from the concrete. Clear distance between frame-mounted vibrating units that have spuds that extend into the slab at intervals across the paving lane shall not exceed 30 inches. Distance between end of vibrating tube and side form shall not exceed 2 inches. For pavements less than 10 inches thick, operate vibrators at mid-depth parallel with or at a slight angle to the subbase. For thicker pavements, angle vibrators toward the vertical, with vibrator tip preferably about 2 inches from subbase, and top of vibrator a few inches below pavement surface. Vibrators may be pneumatic, gas driven, or electric, and shall be operated at frequencies within the concrete of not less than 8,000 vibrations per minute. Amplitude of vibration shall be such that noticeable vibrations occur at 1.5 foot radius when the vibrator is inserted in the concrete to the depth specified.

3.3.6 Cold Weather

Except with authorization, do not place concrete when ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. When authorized, when concrete is likely to be subjected to freezing within 24 hours after placing, heat concrete materials so that temperature of concrete when deposited is between 65 and 80 degrees F. Methods of heating materials are subject to approval

of the Contracting Officer. Do not heat mixing water above 165 degrees F. Remove lumps of frozen material and ice from aggregates before placing aggregates in mixer. Follow practices found in ACI 306.1.

3.3.7 Hot Weather

Maintain required concrete temperature in accordance with Figure 2.1.5 in ACI 305R to prevent evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. After placement, use fog spray, apply monomolecular film, or use other suitable means to reduce the evaporation rate. Start curing when surface of fresh concrete is sufficiently hard to permit curing without damage. Cool underlying material by sprinkling lightly with water before placing concrete. Follow practices found in ACI 305R.

3.4 PAVING

Pavement shall be constructed with paving and finishing equipment utilizing fixed forms or slipforms.

3.4.1 Consolidation

The paver vibrators shall be inserted into the concrete not closer to the underlying material than 2 inches. The vibrators or any tamping units in front of the paver shall be automatically controlled so that they shall be stopped immediately as forward motion ceases. Excessive vibration shall not be permitted. Concrete in small, odd-shaped slabs or in locations inaccessible to the paver mounted vibration equipment shall be vibrated with a hand-operated immersion vibrator. Vibrators shall not be used to transport or spread the concrete.

3.4.2 Operation

When the paver is operated between or adjacent to previously constructed pavement (fill-in lanes), provisions shall be made to prevent damage to the previously constructed pavement, including keeping the existing pavement surface free of any debris, and placing rubber mats beneath the paver tracks. Transversely oscillating screeds and extrusion plates shall overlap the existing pavement the minimum possible, but in no case more than 8 inches.

3.4.3 Required Results

The paver-finisher shall be operated to produce a thoroughly consolidated slab throughout, true to line and grade within specified tolerances. The paver-finishing operation shall produce a surface finish free of irregularities, tears, voids of any kind, and any other discontinuities. It shall produce only a very minimum of paste at the surface. Multiple passes of the paver-finisher shall not be permitted. The equipment and its operation shall produce a finished surface requiring no hand finishing, other than the use of cutting straightedges, except in very infrequent instances. No water, other than true fog sprays (mist), shall be applied to the concrete surface during paving and finishing.

3.4.4 Fixed Form Paving

Forms shall be steel, except that wood forms may be used for curves having

a radius of 150 feet or less, and for fillets. Forms may be built up with metal or wood, added only to the base, to provide an increase in depth of not more than 25 percent. The base width of the form shall be not less than eight-tenths of the vertical height of the form, except that forms 8 inches or less in vertical height shall have a base width not less than the vertical height of the form. Wood forms for curves and fillets shall be adequate in strength and rigidly braced. Forms shall be set on firm material cut true to grade so that each form section when placed will be firmly in contact with the underlying layer for its entire base. Forms shall not be set on blocks or on built-up spots of underlying material. Forms for overlay pavements and for other locations where forms must be set on existing pavements shall be held securely in place with stakes or by other approved methods. Holes in existing pavements for form stakes shall be carefully drilled without cracking or spalling the existing pavement. Prior to setting forms for paving operations, the Contractor shall demonstrate the proposed form setting procedures at an approved location and shall not proceed further until the proposed method is approved. Forms shall remain in place at least 12 hours after the concrete has been placed. Forms shall be removed without injuring the concrete.

3.4.5 Slipform Paving

The slipform paver shall shape the concrete to the specified and indicated cross section in one pass, and shall finish the surface and edges so that only a very minimum amount of hand finishing is required. Dowels shall not be installed by dowel inserters attached to the paver or by any other means of inserting the dowels into the plastic concrete. If a keyway is required, a 26 gauge thick metal keyway liner shall be installed as the keyway is extruded.

3.4.6 Placing Reinforcing Steel

Reinforcement shall be positioned on suitable chairs securely fastened to the subgrade prior to concrete placement.

3.4.7 Placing Dowels and Tie Bars

Dowels shall be installed with alignment not greater than 1/8 inch per ft. Except as otherwise specified below, location of dowels shall be within a horizontal tolerance of plus or minus 5/8 inch and a vertical tolerance of plus or minus 3/16 inch. The portion of each dowel intended to move within the concrete or expansion cap shall be painted with one coat of rust inhibiting primer paint, and then oiled just prior to placement. Dowels and tie bars in joints shall be omitted when the center of the dowel or tie bar is located within a horizontal distance from an intersecting joint equal to or less than one-fourth of the slab thickness.

3.4.7.1 Contraction Joints

Dowels and tie bars in longitudinal and transverse contraction joints within the paving lane shall be held securely in place by means of rigid metal basket assemblies. The dowels and tie bars shall be welded to the assembly or held firmly by mechanical locking arrangements that will prevent them from becoming distorted during paving operations. The basket assemblies shall be held securely in the proper location by means of suitable anchors.

3.4.7.2 Construction Joints-Fixed Form Paving

Installation of dowels and tie bars shall be by the bonded-in-place method, supported by means of devices fastened to the forms. Installation by removing and replacing in preformed holes will not be permitted.

3.4.7.3 Dowels Installed in Hardened Concrete

Installation shall be by bonding the dowels into holes drilled into the hardened concrete. Holes approximately 1/8 inch greater in diameter than the dowels shall be drilled into the hardened concrete. Dowels shall be bonded in the drilled holes using epoxy resin injected at the back of the hole before installing the dowel and extruded to the collar during insertion of the dowel so as to completely fill the void around the dowel. Application by buttering the dowel shall not be permitted. The dowels shall be held in alignment at the collar of the hole, after insertion and before the grout hardens, by means of a suitable metal or plastic collar fitted around the dowel. The vertical alignment of the dowels shall be checked by placing the straightedge on the surface of the pavement over the top of the dowel and measuring the vertical distance between the straightedge and the beginning and ending point of the exposed part of the dowel. Where tie bars are required in longitudinal construction joints of slipform pavement, bent tie bars shall be installed at the paver, in front of the transverse screed or extrusion plate. If tie bars are required, a standard keyway shall be constructed, and the bent tie bars shall be inserted into the plastic concrete through a 26 gauge thick metal keyway liner. Tie bars shall not be installed in preformed holes. The keyway liner shall be protected and shall remain in place and become part of the joint. Before placement of the adjoining paving lane, the tie bars shall be straightened, without spalling the concrete around the bar.

3.4.7.4 Expansion Joints

Dowels in expansion joints shall be installed by the bonded-in-place method or by bonding into holes drilled in hardened concrete, using procedures specified above.

3.5 FINISHING CONCRETE

Start finishing operations immediately after placement of concrete. Use finishing machine, except hand finishing may be used in emergencies and for concrete slabs in inaccessible locations or of such shapes or sizes that machine finishing is impracticable. Finish pavement surface on both sides of a joint to the same grade. Finish formed joints from a securely supported transverse bridge. Provide hand finishing equipment for use at all times. Transverse and longitudinal surface tolerances shall be 1/4 inch in 10 feet.

3.5.1 Side Form Finishing

Strike off and screed concrete to the required slope and cross-section by a power-driven transverse finishing machine. Transverse rotating tube or pipe shall not be permitted unless approved by the Contracting Officer. Elevation of concrete shall be such that, when consolidated and finished, pavement surface will be adequately consolidated and at the required grade. Equip finishing machine with two screeds which are readily and accurately adjustable for changes in pavement slope and compensation for wear and other causes. Make as many passes over each area of pavement and at such intervals as necessary to give proper compaction, retention of

coarse aggregate near the finished surface, and a surface of uniform texture, true to grade and slope. Do not permit excessive operation over an area, which will result in an excess of mortar and water being brought to the surface.

3.5.1.1 Equipment Operation

Maintain the travel of machine on the forms without lifting, wobbling, or other variation of the machine which tend to affect the precision of concrete finish. Keep the tops of the forms clean by a device attached to the machine. During the first pass of the finishing machine, maintain a uniform ridge of concrete ahead of the front screed for its entire length.

3.5.1.2 Joint Finish

Before concrete is hardened, correct edge slump of pavement, exclusive of edge rounding, in excess of 0.02 foot. Finish concrete surface on each side of construction joints to the same plane, and correct deviations before newly placed concrete has hardened.

3.5.1.3 Hand Finishing

Strike-off and screed surface of concrete to elevations slightly above finish grade so that when concrete is consolidated and finished pavement surface is at the indicated elevation. Vibrate entire surface until required compaction and reduction of surface voids is secured with a strike-off template.

3.5.1.4 Longitudinal Floating

After initial finishing, further smooth and consolidate concrete by means of hand-operated longitudinal floats. Use floats that are not less than 12 feet long and 6 inches wide and stiffened to prevent flexing and warping.

3.5.2 Texturing

Before the surface sheen has disappeared and before the concrete hardens, the surface of the pavement shall be given a texture as described herein. Following initial texturing on the first day of placement, the Placing Foreman, Contracting Officer representative, and a representative of the Using Agency shall inspect the texturing for compliance with design requirements. After curing is complete, all textured surfaces shall be thoroughly power broomed to remove all debris. The concrete in areas of recesses for tie-down anchors, lighting fixtures, and other outlets in the pavement shall be finished to provide a surface of the same texture as the surrounding area.

3.5.2.1 Burlap Drag Finish

Before concrete becomes non-plastic, finish the surface of the slab by dragging on the surface a strip of clean, wet burlap measuring from 3 to 10 feet long and 2 feet wider than the width of the pavement. Select dimension of burlap drag so that at least 3 feet of the material is in contact with the pavement. Drag the surface so as to produce a finished surface with a fine granular or sandy texture without leaving disfiguring marks.

3.5.3 Edging

At the time the concrete has attained a degree of hardness suitable for edging, carefully finish slab edges, including edges at formed joints, with an edge having a maximum radius of one-eighth inch. Clean by removing loose fragments and soupy mortar from corners or edges of slabs which have crumbled and areas which lack sufficient mortar for proper finishing. Refill voids solidly with a mixture of suitable proportions and consistency and refinish. Remove unnecessary tool marks and edges. Remaining edges shall be smooth and true to line.

3.5.4 Repair of Surface Defects

Follow guidance of ACI 301.

3.6 CURING AND PROTECTION

Protect concrete adequately from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks and oil stains, and do not allow it to dry out from the time it is placed until the expiration of the minimum curing periods specified herein. Use White-Burlap-Polyethylene Sheet or liquid membrane-forming compound, except as specified otherwise herein. Do not use membrane-forming compound on surfaces where its appearance would be objectionable, on surfaces to be painted, where coverings are to be bonded to concrete, or on concrete to which other concrete is to be bonded. Maintain temperature of air next to concrete above 40 degrees F for the full curing periods.

3.6.1 White-Burlap-Polyethylene Sheet

Wet entire exposed surface thoroughly with a fine spray of water, saturate burlap but do not have excessive water dripping off the burlap and then cover concrete with White-Burlap-Polyethylene Sheet, burlap side down. Lay sheets directly on concrete surface and overlap 12 inches. Make sheeting not less than 18 inches wider than concrete surface to be cured, and weight down on the edges and over the transverse laps to form closed joints. Repair or replace sheets when damaged during curing. Check daily to assure burlap has not lost all moisture. If moisture evaporates, resaturate burlap and re-place on pavement (re-saturation and re-placing shall take no longer than 10 minutes per sheet). Leave sheeting on concrete surface to be cured for at least 7 days.

3.6.2 Liquid Membrane-Forming Compound Curing

Apply compound immediately after surface loses its water sheen and has a dull appearance and before joints are sawed. Agitate curing compound thoroughly by mechanical means during use and apply uniformly in a two-coat continuous operation by suitable power-spraying equipment. Total coverage for the two coats shall be at least one gallon of undiluted compound per 200 square feet. Compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. Apply an additional coat of compound immediately to areas where film is defective. Respray concrete surfaces that are subject to heavy rainfall within 3 hours after curing compound has been applied in the same manner.

3.6.2.1 Protection of Treated Surfaces

Keep concrete surfaces to which liquid membrane-forming compounds have been

applied free from vehicular traffic and other sources of abrasion for not less than 72 hours. Foot traffic is allowed after 24 hours for inspection purposes. Maintain continuity of coating for entire curing period and repair damage to coating immediately.

3.7 FIELD QUALITY CONTROL

3.7.1 Sampling

The Contractor's approved laboratory shall collect samples of fresh concrete in accordance with ASTM C 172 during each working day as required to perform tests specified herein. Make test specimens in accordance with ASTM C 31/C 31M.

3.7.2 Consistency Tests

The Contractor's approved laboratory shall perform concrete slump tests in accordance with ASTM C 143/C 143M. Take samples for slump determination from concrete during placement. Perform tests at the beginning of a concrete placement operation and for each batch (minimum) or every 20 cubic yards (maximum) of concrete to ensure that specification requirements are met. In addition, perform tests each time test beams and cylinders are made.

3.7.3 Compressive Strength Tests

Strength Specimens. Perform at least one set of test specimens, for compressive or flexural strength as appropriate, on each different concrete mixture placed during the day for each 500 cubic yards or portion thereof of that concrete mixture placed each day. Perform additional sets of test specimens, as directed by the Contracting Officer, when the mixture proportions are changed or when low strengths have been detected. Develop a truly random (not haphazard) sampling plan for approval by the Contracting Officer prior to the start of construction. The plan shall ensure that sampling is done in a completely random and unbiased manner. A set of test specimens for concrete with a 28-day specified strength in accordance with paragraph Strength Requirements in PART 1 shall consist of four specimens, two to be tested at 7 days and two at 28 days. Test specimens shall be molded and cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39/C 39M for test cylinders and ASTM C 78 for test beams. Results of all strength tests shall be reported immediately to the Contracting Officer. Quality control charts shall be kept for individual strength "tests", ("test" as defined in paragraph Strength Requirements in PART 1) moving average of last 3 "tests" for strength, and moving average for range for the last 3 "tests" for each mixture. The charts shall be similar to those found in ACI 214R.

3.7.4 Air Content Tests

Test air-entrained concrete for air content at the same frequency as specified for slump tests. Determine percentage of air in accordance with ASTM C 231 on samples taken during placement of concrete in forms.

3.7.5 Surface Testing

Surface testing for surface smoothness and plan grade shall be performed as indicated below by the Testing Laboratory. The measurements shall be properly referenced in accordance with paving lane identification and stationing, and a report given to the Government within 24 hours after

measurement is made. A final report of surface testing, signed by a Registered Engineer, containing all surface measurements and a description of all actions taken to correct deficiencies, shall be provided to the Government upon conclusion of surface testing.

3.7.5.1 Surface Smoothness Requirements

The finished surfaces of the pavements shall have no abrupt change of 1/8 inch or more, and all pavements shall be within the tolerances specified when checked with a 12 foot straightedge: 1/5 inch longitudinal and 1/4 inch transverse directions for roads and streets and 1/4 inch for both directions for other concrete surfaces, such as parking areas.

3.7.5.2 Surface Smoothness Testing Method

The surface of the pavement shall be tested with the straightedge to identify all surface irregularities exceeding the tolerances specified above. The entire area of the pavement shall be tested in both a longitudinal and a transverse direction on parallel lines approximately 15 feet apart. The straightedge shall be held in contact with the surface and moved ahead one-half the length of the straightedge for each successive measurement. The amount of surface irregularity shall be determined by placing the straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length and measuring the maximum gap between the straightedge and the pavement surface, in the area between these two high points.

3.7.6 Plan Grade Testing and Conformance

The surfaces shall vary not more than 0.06 foot above or below the plan grade line or elevation indicated. Each pavement category shall be checked by the Contractor for conformance with plan grade requirements by running lines of levels at intervals to determine the elevation at each joint intersection.

3.7.7 Test for Pavement Thickness

Measure during concrete placement to determine in-place thickness of concrete pavement.

3.7.8 Reinforcement

Inspect reinforcement prior to installation to assure it is free of loose flaky rust, loose scale, oil, mud, or other objectionable material.

3.7.9 Dowels

Inspect dowel placement prior to placing concrete to assure that dowels are of the size indicated, and are spaced, aligned and painted and oiled as specified. Dowels shall not deviate from vertical or horizontal alignment after concrete has been placed by more than 1/8 inch per foot.

3.8 WASTE MANAGEMENT

In accordance with the Waste Management Plan.

-- End of Section --

SECTION 32 16 13

CONCRETE SIDEWALKS AND CURBS

04/08

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO M 182 (2005) Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats

ASTM INTERNATIONAL (ASTM)

ASTM A 185/A 185M (2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete

ASTM A 615/A 615M (2009) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

ASTM C 143/C 143M (2009) Standard Test Method for Slump of Hydraulic-Cement Concrete

ASTM C 171 (2007) Standard Specification for Sheet Materials for Curing Concrete

ASTM C 172 (2008) Standard Practice for Sampling Freshly Mixed Concrete

ASTM C 173/C 173M (2009) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

ASTM C 231 (2009a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

ASTM C 309 (2007) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

ASTM C 31/C 31M (2009) Standard Practice for Making and Curing Concrete Test Specimens in the Field

ASTM C 920 (2008) Standard Specification for Elastomeric Joint Sealants

ASTM D 1751 (2004; R 2008) Standard Specification for

Preformed Expansion Joint Filler for
Concrete Paving and Structural
Construction (Nonextruding and Resilient
Bituminous Types)

ASTM D 1752

(2004a; R 2008) Standard Specification for
Preformed Sponge Rubber Cork and Recycled
PVC Expansion

ASTM D 5893

(2004) Cold Applied, Single Component,
Chemically Curing Silicone Joint Sealant
for Portland Cement Concrete Pavements

1.2 SYSTEM DESCRIPTION

1.2.1 General Requirements

Provide plant, equipment, machines, and tools used in the work subject to approval and maintained in a satisfactory working condition at all times. The equipment shall have the capability of producing the required product, meeting grade controls, thickness control and smoothness requirements as specified. Use of the equipment shall be discontinued if it produces unsatisfactory results. The Contracting Officer shall have access at all times to the plant and equipment to ensure proper operation and compliance with specifications.

1.2.2 Slip Form Equipment

Slip form paver or curb forming machine, will be approved based on trial use on the job and shall be self-propelled, automatically controlled, crawler mounted, and capable of spreading, consolidating, and shaping the plastic concrete to the desired cross section in 1 pass.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00
SUBMITTAL PROCEDURES:

SD-03 Product Data

Concrete

Copies of certified delivery tickets for all concrete used in the construction.

SD-06 Test Reports

Field Quality Control

Copies of all test reports within 24 hours of completion of the test.

1.4 ENVIRONMENTAL REQUIREMENTS

1.4.1 Placing During Cold Weather

Do not place concrete when the air temperature reaches 40 degrees F and is

falling, or is already below that point. Placement may begin when the air temperature reaches 35 degrees F and is rising, or is already above 40 degrees F. Make provisions to protect the concrete from freezing during the specified curing period. If necessary to place concrete when the temperature of the air, aggregates, or water is below 35 degrees F, placement and protection shall be approved in writing. Approval will be contingent upon full conformance with the following provisions. The underlying material shall be prepared and protected so that it is entirely free of frost when the concrete is deposited. Mixing water and aggregates shall be heated as necessary to result in the temperature of the in-place concrete being between 50 and 85 degrees F. Methods and equipment for heating shall be approved. The aggregates shall be free of ice, snow, and frozen lumps before entering the mixer. Covering and other means shall be provided for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing, and at a temperature above freezing for the remainder of the curing period.

1.4.2 Placing During Warm Weather

The temperature of the concrete as placed shall not exceed 85 degrees F except where an approved retarder is used. The mixing water and/or aggregates shall be cooled, if necessary, to maintain a satisfactory placing temperature. The placing temperature shall not exceed 95 degrees F at any time.

PART 2 PRODUCTS

2.1 CONCRETE

Provide concrete conforming to the applicable requirements of Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE except as otherwise specified. Concrete shall have a minimum compressive strength of 4000 psi at 28 days. Maximum size of aggregate shall be 1-1/2 inches.

2.1.1 Air Content

Mixtures shall have air content by volume of concrete of 4 to 7 percent, based on measurements made immediately after discharge from the mixer.

2.1.2 Slump

The concrete slump shall be 2 inches plus or minus 1 inch where determined in accordance with ASTM C 143/C 143M.

2.1.3 Reinforcement Steel

Reinforcement bars shall conform to ASTM A 615/A 615M. Wire mesh reinforcement shall conform to ASTM A 185/A 185M.

2.2 CONCRETE CURING MATERIALS

2.2.1 Impervious Sheet Materials

Impervious sheet materials shall conform to ASTM C 171, type optional, except that polyethylene film, if used, shall be white opaque.

2.2.2 Burlap

Burlap shall conform to AASHTO M 182.

2.2.3 White Pigmented Membrane-Forming Curing Compound

White pigmented membrane-forming curing compound shall conform to ASTM C 309, Type 2.

2.3 CONCRETE PROTECTION MATERIALS

Concrete protection materials shall be a linseed oil mixture of equal parts, by volume, of linseed oil and either mineral spirits, naphtha, or turpentine. At the option of the Contractor, commercially prepared linseed oil mixtures, formulated specifically for application to concrete to provide protection against the action of deicing chemicals may be used, except that emulsified mixtures are not acceptable.

2.4 JOINT FILLER STRIPS

2.4.1 Expansion Joint Filler, Premolded

Expansion joint filler, premolded, shall conform to ASTM D 1751 or ASTM D 1752, width as indicated in drawings.

2.5 JOINT SEALANTS

Joint sealant, cold-applied shall conform to ASTM C 920 or ASTM D 5893.

2.6 FORM WORK

Design and construct form work to ensure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified. Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete. Wood forms shall be surfaced plank, 2 inches nominal thickness, straight and free from warp, twist, loose knots, splits or other defects. Wood forms shall have a nominal length of 10 feet. Radius bends may be formed with 3/4 inch boards, laminated to the required thickness. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points. Ends of steel forms shall be interlocking and self-aligning. Steel forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers. Steel forms shall have a nominal length of 10 feet with a minimum of 3 welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

2.6.1 Sidewalk Forms

Sidewalk forms shall be of a height equal to the full depth of the finished sidewalk.

2.6.2 Curb Forms

Curb outside forms shall have a height equal to the full depth of the curb or gutter. Curbs will be poured integral with the adjacent concrete pavement. Rigid forms shall be provided for curb returns, except that benders or thin plank forms may be used for curb or curb returns with a radius of 10 feet or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used. Back forms for curb returns may be made of

1-1/2 inch benders, for the full height of the curb, cleated together.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

The subgrade shall be constructed to the specified grade and cross section prior to concrete placement. Subgrade shall be placed and compacted as directed in conformance with Section 31 00 00 EARTHWORK.

3.1.1 Sidewalk Subgrade

The subgrade shall be tested for grade and cross section with a template extending the full width of the sidewalk and supported between side forms.

3.2 FORM SETTING

Set forms to the indicated alignment, grade and dimensions. Hold forms rigidly in place by a minimum of 3 stakes per form placed at intervals not to exceed 4 feet. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Clamps, spreaders, and braces shall be used where required to ensure rigidity in the forms. Forms shall be removed without injuring the concrete. Bars or heavy tools shall not be used against the concrete in removing the forms. Any concrete found defective after form removal shall be promptly and satisfactorily repaired. Forms shall be cleaned and coated with form oil each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory.

3.2.1 Sidewalks

Set forms for sidewalks with the upper edge true to line and grade with an allowable tolerance of 1/8 inch in any 10 foot long section. After forms are set, grade and alignment shall be checked with a 10 foot straightedge. Forms shall have a transverse slope as indicated in the drawings. Side forms shall not be removed for 12 hours after finishing has been completed.

3.3 SIDEWALK CONCRETE PLACEMENT AND FINISHING

3.3.1 Formed Sidewalks

Place concrete in the forms in one layer. When consolidated and finished, the sidewalks shall be of the thickness indicated. After concrete has been placed in the forms, a strike-off guided by side forms shall be used to bring the surface to proper section to be compacted. The concrete shall be consolidated with an approved vibrator, and the surface shall be finished to grade with a strike off.

3.3.2 Concrete Finishing

After straightedging, when most of the water sheen has disappeared, and just before the concrete hardens, finish the surface with a wood float or darby to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. A scored surface shall be produced by brooming with a fiber-bristle brush in a direction transverse to that of the traffic, followed by edging.

3.3.3 Edge and Joint Finishing

All slab edges, including those at formed joints, shall be finished with an edger having a radius of 1/8 inch. Transverse joint shall be edged before brooming, and the brooming shall eliminate the flat surface left by the surface face of the edger. Corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing shall be cleaned and filled solidly with a properly proportioned mortar mixture and then finished.

3.3.4 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 5/16 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.4 CURB CONCRETE PLACEMENT AND FINISHING

Curbs will be poured integral with the adjacent concrete pavement.

3.4.1 Formed Curb

Concrete shall be placed to the section required in a single lift. Consolidation shall be achieved by using approved mechanical vibrators. Curve shaped gutters shall be finished with a standard curb "mule".

3.4.2 Curb Finishing

Concrete shall be formed, placed, and finished by hand using a properly shaped "mule" or constructed using a slipform machine specially designed for this work. Contraction joints shall be cut 3 inches deep with a jointing tool after the surface has been finished. Expansion joints (3/4 inch wide) shall be provided at 600 feet maximum spacing, at all structures, intersection P.C.'s, and intersection P.T.'s, unless otherwise indicated.

3.4.3 Concrete Finishing

Exposed surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes. The edges of the top of the curb shall be rounded with an edging tool to a radius of as indicated. The face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The front curb surface, while still wet, shall be brushed with a stiff bristled brush.

3.4.4 Joint Finishing

Curb edges at formed joints shall be finished as indicated in the drawings.

3.4.5 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.5 SIDEWALK JOINTS

Sidewalk joints shall be constructed to divide the surface into rectangular areas. Transverse contraction joints shall be spaced at a distance equal to the sidewalk width or 5 feet on centers, whichever is less, and shall be continuous across the slab. Longitudinal contraction joints shall be constructed along the centerline of all sidewalks 10 feet or more in width. Transverse expansion joints shall be installed at sidewalk returns and opposite expansion joints in adjoining curbs. Where the sidewalk is not in contact with the curb, transverse expansion joints shall be installed as indicated. Expansion joints shall be formed about structures and features which project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated. Expansion joints are not required between sidewalks and curb that abut the sidewalk longitudinally.

3.5.1 Sidewalk Contraction Joints

The contraction joints shall be formed in the fresh concrete by cutting a groove in the top portion of the slab to the depth indicated, using a jointer to cut the groove, or by sawing a groove in the hardened concrete with a power-driven saw, unless otherwise approved. Sawed joints shall be constructed by sawing a groove in the concrete with a 1/8 inch blade to the depth indicated. An ample supply of saw blades shall be available on the job before concrete placement is started, and at least one standby sawing unit in good working order shall be available at the jobsite at all times during the sawing operations.

3.5.2 Sidewalk Expansion Joints

Expansion joints shall be formed with 1/2 inch joint filler strips. Joint filler in expansion joints surrounding structures and features within the sidewalk may consist of preformed filler material conforming to ASTM D 1752 or building paper. Joint filler shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Immediately after finishing operations are completed, joint edges shall be rounded with an edging tool having a radius of 1/8 inch, and concrete over the joint filler shall be removed. At the end of the curing period, expansion joints shall be cleaned and filled with cold-applied joint sealant. Joint sealant shall be gray or stone in color. Joints shall be sealed as specified in Section 32 01 19 FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS.

3.5.3 Reinforcement Steel Placement

Reinforcement steel shall be accurately and securely fastened in place with suitable supports and ties before the concrete is placed.

3.6 CURB JOINTS

Curb joints shall be constructed at right angles to the line of the curb. Joints shall align with joint spacing in adjacent pavement. Both joints in pavement and curb will be installed concurrently, since the curb is poured integral with the adjacent pavement.

3.6.1 Contraction Joints

Contraction joints shall be constructed directly opposite contraction joints in abutting portland cement concrete pavements and spaced so that

monolithic sections between curb returns will not be less than 5 feet nor greater than the joint spacing in the adjacent pavement.

a. Contraction joints (except for slip forming) shall be constructed by means of 1/8 inch thick separators and of a section conforming to the cross section of the curb. Separators shall be removed as soon as practicable after concrete has set sufficiently to preserve the width and shape of the joint and prior to finishing.

b. When slip forming is used, the contraction joints shall be cut in the top portion of the curb hardened concrete in a continuous cut across the curb, using a power-driven saw. The depth of cut shall be at least one-fourth of the gutter/curb depth and 1/8 inch in width.

3.6.2 Expansion Joints

Expansion joints shall be formed by means of preformed expansion joint filler material cut and shaped to the cross section of curb and gutter. Expansion joints shall be provided in curb directly opposite expansion joints of abutting portland cement concrete pavement, and shall be of the same type and thickness as joints in the pavement. Where curb and gutter do not abut portland cement concrete pavement, expansion joints at least 1/2 inch in width shall be provided at intervals not less than 30 feet nor greater than 120 feet. Expansion joints shall be provided in nonreinforced concrete gutter at locations indicated. Expansion joints shall be sealed immediately following curing of the concrete or as soon thereafter as weather conditions permit. Joints shall be sealed as specified in Section 32 01 19 FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS.

3.7 CURING AND PROTECTION

3.7.1 General Requirements

Protect concrete against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation. Protect unhardened concrete from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins. Protection shall be provided as necessary to prevent cracking of the pavement due to temperature changes during the curing period.

3.7.1.1 Mat Method

The entire exposed surface shall be covered with 2 or more layers of burlap. Mats shall overlap each other at least 6 inches. The mat shall be thoroughly wetted with water prior to placing on concrete surface and shall be kept continuously in a saturated condition and in intimate contact with concrete for not less than 7 days.

3.7.1.2 Impervious Sheeting Method

The entire exposed surface shall be wetted with a fine spray of water and then covered with impervious sheeting material. Sheets shall be laid directly on the concrete surface with the light-colored side up and overlapped 12 inches when a continuous sheet is not used. The curing medium shall not be less than 18-inches wider than the concrete surface to be cured, and shall be securely weighted down by heavy wood planks, or a bank of moist earth placed along edges and laps in the sheets. Sheets shall be satisfactorily repaired or replaced if torn or otherwise damaged

during curing. The curing medium shall remain on the concrete surface to be cured for not less than 7 days.

3.7.1.3 Membrane Curing Method

A uniform coating of white-pigmented membrane-curing compound shall be applied to the entire exposed surface of the concrete as soon after finishing as the free water has disappeared from the finished surface. Formed surfaces shall be coated immediately after the forms are removed and in no case longer than 1 hour after the removal of forms. Concrete shall not be allowed to dry before the application of the membrane. If any drying has occurred, the surface of the concrete shall be moistened with a fine spray of water and the curing compound applied as soon as the free water disappears. Curing compound shall be applied in two coats by hand-operated pressure sprayers at a coverage of approximately 200 square feet/gallon for the total of both coats. The second coat shall be applied in a direction approximately at right angles to the direction of application of the first coat. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. If pinholes, abrasion, or other discontinuities exist, an additional coat shall be applied to the affected areas within 30 minutes. Concrete surfaces that are subjected to heavy rainfall within 3 hours after the curing compound has been applied shall be resprayed by the method and at the coverage specified above. Areas where the curing compound is damaged by subsequent construction operations within the curing period shall be resprayed. Necessary precautions shall be taken to insure that the concrete is properly cured at sawed joints, and that no curing compound enters the joints. The top of the joint opening and the joint groove at exposed edges shall be tightly sealed before the concrete in the region of the joint is resprayed with curing compound. The method used for sealing the joint groove shall prevent loss of moisture from the joint during the entire specified curing period. Approved standby facilities for curing concrete pavement shall be provided at a location accessible to the jobsite for use in the event of mechanical failure of the spraying equipment or other conditions that might prevent correct application of the membrane-curing compound at the proper time. Concrete surfaces to which membrane-curing compounds have been applied shall be adequately protected during the entire curing period from pedestrian and vehicular traffic, except as required for joint-sawing operations and surface tests, and from any other possible damage to the continuity of the membrane.

3.7.2 Backfilling

After curing, debris shall be removed and the area adjoining the concrete shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with lines and grades indicated.

3.7.3 Protection

Completed concrete shall be protected from damage until accepted. Repair damaged concrete and clean concrete discolored during construction. Concrete that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

3.7.4 Protective Coating

Protective coating, of linseed oil mixture, shall be applied to the exposed-to-view concrete surface after the curing period, if concrete will be exposed to de-icing chemicals within 6 weeks after placement. Concrete to receive a protective coating shall be moist cured.

3.7.4.1 Application

Curing and backfilling operation shall be completed prior to applying two coats of protective coating. Concrete shall be surface dry and clean before each application. Coverage shall be by spray application at not more than 50 square yards/gallon for first application and not more than 70 square yards/gallon for second application, except that the number of applications and coverage for each application for commercially prepared mixture shall be in accordance with the manufacturer's instructions. Coated surfaces shall be protected from vehicular and pedestrian traffic until dry.

3.7.4.2 Precautions

Protective coating shall not be heated by direct application of flame or electrical heaters and shall be protected from exposure to open flame, sparks, and fire adjacent to open containers or applicators. Material shall not be applied at ambient or material temperatures lower than 50 degrees F.

3.8 FIELD QUALITY CONTROL

3.8.1 General Requirements

Perform the inspection and tests described and meet the specified requirements for inspection details and frequency of testing. Based upon the results of these inspections and tests, take the action and submit reports as required below, and any additional tests to insure that the requirements of these specifications are met.

3.8.2 Concrete Testing

3.8.2.1 Strength Testing

Provide molded concrete specimens for strength tests. Samples of concrete placed each day shall be taken not less than once a day nor less than once for every 250 cubic yards of concrete. The samples for strength tests shall be taken in accordance with ASTM C 172. Cylinders for acceptance shall be molded in conformance with ASTM C 31/C 31M by an approved testing laboratory. Each strength test result shall be the average of 2 test cylinders from the same concrete sample tested at 28 days, unless otherwise specified or approved. Concrete specified on the basis of compressive strength will be considered satisfactory if the averages of all sets of three consecutive strength test results equal or exceed the specified strength, and no individual strength test result falls below the specified strength by more than 500 psi.

3.8.2.2 Air Content

Determine air content in accordance with ASTM C 173/C 173M or ASTM C 231. ASTM C 231 shall be used with concretes and mortars made with relatively dense natural aggregates. Two tests for air content shall be made on

randomly selected batches of each class of concrete placed during each shift. Additional tests shall be made when excessive variation in concrete workability is reported by the placing foreman or the Government inspector. If results are out of tolerance, the placing foreman shall be notified and he shall take appropriate action to have the air content corrected at the plant. Additional tests for air content will be performed on each truckload of material until such time as the air content is within the tolerance specified.

3.8.2.3 Slump Test

Two slump tests shall be made on randomly selected batches of each class of concrete for every 250 cubic yards, or fraction thereof, of concrete placed during each shift. Additional tests shall be performed when excessive variation in the workability of the concrete is noted or when excessive crumbling or slumping is noted along the edges of slip-formed concrete.

3.8.3 Thickness Evaluation

The anticipated thickness of the concrete shall be determined prior to placement by passing a template through the formed section or by measuring the depth of opening of the extrusion template of the curb forming machine. If a slip form paver is used for sidewalk placement, the subgrade shall be true to grade prior to concrete placement and the thickness will be determined by measuring each edge of the completed slab.

3.8.4 Surface Evaluation

The finished surface of each category of the completed work shall be uniform in color and free of blemishes and form or tool marks.

3.9 SURFACE DEFICIENCIES AND CORRECTIONS

3.9.1 Thickness Deficiency

When measurements indicate that the completed concrete section is deficient in thickness by more than 1/4 inch the deficient section will be removed, between regularly scheduled joints, and replaced.

3.9.2 High Areas

In areas not meeting surface smoothness and plan grade requirements, high areas shall be reduced either by rubbing the freshly finished concrete with carborundum brick and water when the concrete is less than 36 hours old or by grinding the hardened concrete with an approved surface grinding machine after the concrete is 36 hours old or more. The area corrected by grinding the surface of the hardened concrete shall not exceed 5 percent of the area of any integral slab, and the depth of grinding shall not exceed 1/4 inch. Pavement areas requiring grade or surface smoothness corrections in excess of the limits specified above shall be removed and replaced.

3.9.3 Appearance

Exposed surfaces of the finished work will be inspected by the Government and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work shall be removed and replaced.

-- End of Section --

SECTION 32 17 24.00 10

PAVEMENT MARKINGS

04/08

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO M 247 (2007) Glass Beads Used in Traffic Paints

ASTM INTERNATIONAL (ASTM)

ASTM D 4505 (2005) Preformed Retroreflective Pavement
Marking Tape for Extended Service Life

ASTM D 792 (2000) Density and Specific Gravity
(Relative Density) of Plastics by
Displacement

ASTM E 28 (1999; R 2004) Softening Point of Resins
Derived from Naval Stores by Ring and Ball
Apparatus

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-B-1325 (Rev C) Beads (Glass Spheres)
Retro-Reflective (Metric)

FS TT-P-1952 (Rev D) Paint, Traffic and Airfield
Markings, Waterborne

1.2 SYSTEM DESCRIPTION

All machines, tools and equipment used in the performance of the work shall be approved and maintained in satisfactory operating condition. Equipment operating on roads and runways shall display low speed traffic markings and traffic warning lights.

1.2.1 Paint Application Equipment

1.2.1.1 Self-Propelled or Mobile-Drawn Pneumatic Spraying Machines

The equipment to apply paint to pavements shall be a self-propelled or mobile-drawn pneumatic spraying machine with suitable arrangements of atomizing nozzles and controls to obtain the specified results. The machine shall have a speed during application not less than 5 mph, and shall be capable of applying the stripe widths indicated, at the paint coverage rate specified in paragraph APPLICATION, and of even uniform thickness with clear-cut edges. . The paint applicator shall have paint

reservoirs or tanks of sufficient capacity and suitable gauges to apply paint in accordance with requirements specified. Tanks shall be equipped with suitable air-driven mechanical agitators. The spray mechanism shall be equipped with quick-action valves conveniently located, and shall include necessary pressure regulators and gauges in full view and reach of the operator. Paint strainers shall be installed in paint supply lines to ensure freedom from residue and foreign matter that may cause malfunction of the spray guns. The paint applicator shall be readily adaptable for attachment of an air-actuated dispenser for the reflective media approved for use. Pneumatic spray guns shall be provided for hand application of paint in areas where the mobile paint applicator cannot be used.

1.2.1.2 Hand-Operated, Push-Type Machines

All machines, tools, and equipment used in performance of the work shall be approved and maintained in satisfactory operating condition. Hand-operated push-type machines of a type commonly used for application of paint to pavement surfaces will be acceptable for marking small streets and parking areas. Applicator machine shall be equipped with the necessary paint tanks and spraying nozzles, and shall be capable of applying paint uniformly at coverage specified. Sandblasting equipment shall be provided as required for cleaning surfaces to be painted. Hand-operated spray guns shall be provided for use in areas where push-type machines cannot be used.

1.2.2 Thermoplastic Application Equipment

1.2.2.1 Thermoplastic Material

Thermoplastic material shall be applied to the primed pavement surface by spray techniques or by the extrusion method, wherein one side of the shaping die is the pavement and the other three sides are contained by, or are part of, suitable equipment for heating and controlling the flow of material. By either method, the markings shall be applied with equipment that is capable of providing continuous uniformity in the dimensions of the stripe.

1.2.2.2 Application Equipment

a. Application equipment shall provide continuous mixing and agitation of the material. Conveying parts of the equipment between the main material reservoir and the extrusion shoe or spray gun shall prevent accumulation and clogging. All parts of the equipment which come into contact with the material shall be easily accessible and exposable for cleaning and maintenance. All mixing and conveying parts up to and including the extrusion shoes and spray guns shall maintain the material at the required temperature with heat-transfer oil or electrical-element-controlled heat.

b. The application equipment shall be constructed to ensure continuous uniformity in the dimensions of the stripe. The applicator shall provide a means for cleanly cutting off stripe ends squarely and shall provide a method of applying "skiplines". The equipment shall be capable of applying varying widths of traffic markings.

c. The applicator shall be equipped with a drop-on type bead dispenser capable of uniformly dispensing reflective glass spheres at controlled rates of flow. The bead dispenser shall be automatically operated and shall begin flow prior to the flow of composition to assure that the strip is fully reflectorized.

1.2.2.3 Mobile and Maneuverable

Application equipment shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. The equipment used for the placement of thermoplastic pavement markings shall be of two general types: mobile applicator and portable applicator.

a. Mobile Application Equipment: The mobile applicator shall be defined as a truck-mounted, self-contained pavement marking machine that is capable of hot applying thermoplastic by either the extrusion or spray method. The unit shall be equipped to apply the thermoplastic marking material at temperatures exceeding 375 degrees F, at widths varying from 3 to 12 inches and in thicknesses varying from 0.020 to 0.190 inch and shall have an automatic drop-on bead system. The mobile unit shall be capable of operating continuously and of installing a minimum of 20,000 lineal feet of longitudinal markings in an 8-hour day.

(1) The mobile unit shall be equipped with a melting kettle which holds a minimum of 6000 pounds of molten thermoplastic material. The kettle shall be capable of heating the thermoplastic composition to temperatures of 375 to 425 degrees F. A thermostatically controlled heat transfer liquid shall be used. Heating of the composition by direct flame will not be allowed. Oil and material temperature gauges shall be visible at both ends of the kettle. The mobile unit shall be equipped with a minimum of two extrusion shoes located one on each side of the truck, and shall be capable of marking simultaneous edgeline and centerline stripes. Each extrusion shoe shall be a closed, oil-jacketed unit; shall hold the molten thermoplastic at a temperature of 375 to 425 degrees F; and shall be capable of extruding a line of 3 to 8 inches in width; and at a thickness of not less than 0.125 inch nor more than 0.190 inch, and of generally uniform cross section.

(2) The mobile unit shall be equipped with an electronic programmable line pattern control system. The control system shall be capable of applying skip or solid lines in any sequence, through any and all of the extrusion shoes, or the spray guns, and in programmable cycle lengths. In addition, the mobile unit shall be equipped with an automatic counting mechanism capable of recording the number of lineal feet of thermoplastic markings applied to the pavement surface with an accuracy of 0.5 percent.

b. Portable Application Equipment: The portable applicator shall be defined as hand-operated equipment, specifically designed for placing special markings such as crosswalks, stopbars, legends, arrows, and short lengths of lane, edge and centerlines. The portable applicator shall be capable of applying thermoplastic pavement markings by the extrusion method. The portable applicator shall be loaded with hot thermoplastic composition from the melting kettles on the mobile applicator. The portable applicator shall be equipped with all the necessary components, including a materials storage reservoir, bead dispenser, extrusion shoe, and heating accessories, so as to be capable of holding the molten thermoplastic at a temperature of 375 to 425 degrees F, of extruding a line of 3 to 12 inches in width, and in thicknesses of not less than 0.125 inch nor more than 0.190 inch and of generally uniform cross section.

1.2.3 Reflective Media Dispenser

The dispenser for applying the reflective media shall be attached to the paint dispenser and shall operate automatically and simultaneously with the applicator through the same control mechanism. The dispenser shall be capable of adjustment and designed to provide uniform flow of reflective media over the full length and width of the stripe at the rate of coverage specified in paragraph APPLICATION, at all operating speeds of the applicator to which it is attached.

1.2.4 Preformed Tape Application Equipment

Mechanical application equipment shall be used for the placement of preformed marking tape. Mechanical application equipment shall be defined as a mobile pavement marking machine specifically designed for use in applying precoated, pressure-sensitive pavement marking tape of varying widths, up to 12 inches. The applicator shall be equipped with rollers, or other suitable compactive device, to provide initial adhesion of the preformed, pressure-sensitive marking tape with the pavement surface. Additional hand-operated rollers shall be used as required to properly seat the thermoplastic tape.

1.2.5 Surface Preparation Equipment

1.2.5.1 Sandblasting Equipment

Sandblasting equipment shall include an air compressor, hoses, and nozzles of proper size and capacity as required for cleaning surfaces to be painted. The compressor shall be capable of furnishing not less than 150 cfm of air at a pressure of not less than 90 psi at each nozzle used, and shall be equipped with traps that will maintain the compressed air free of oil and water.

1.2.5.2 Waterblast Equipment

The water pressure shall be specified at 2600 psi at 140 degrees F in order to adequately clean the surfaces to be marked.

1.2.6 Marking Removal Equipment

Equipment shall be mounted on rubber tires and shall be capable of removing markings from the pavement without damaging the pavement surface or joint sealant. Waterblasting equipment shall be capable of producing an adjustable, pressurized stream of water. Sandblasting equipment shall include an air compressor, hoses, and nozzles. The compressor shall be equipped with traps to maintain the air free of oil and water.

1.2.6.1 Shotblasting Equipment

Shotblasting equipment shall be capable of producing an adjustable depth of removal of marking and pavement. Each unit shall be self-cleaning and self-contained, shall be able to confine dust and debris from the operation, and shall be capable of recycling the abrasive for reuse.

1.2.6.2 Chemical Equipment

Chemical equipment shall be capable of application and removal of chemicals from the pavement surface, and shall leave only non-toxic biodegradable residue.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Equipment; G

Lists of proposed equipment, including descriptive data, and notifications of proposed Contractor actions as specified in this section. List of removal equipment shall include descriptive data indicating area of coverage per pass, pressure adjustment range, tank and flow capacities, and safety precautions required for the equipment operation.

Composition Requirements

Manufacturer's current printed product description and Material Safety Data Sheets (MSDS) for each type paint/color proposed for use.

Qualifications

Documentation on personnel qualifications, as specified.

SD-06 Test Reports

Sampling and Testing

Certified copies of the test reports, prior to the use of the materials at the jobsite. Testing shall be performed in an approved independent laboratory.

1.4 QUALITY ASSURANCE

1.4.1 Qualifications

Submit documentation certifying that pertinent personnel are qualified for equipment operation and handling of chemicals.

1.4.2 Traffic Controls

Guidance for traffic control procedures shall be obtained from the Manual on Uniform Traffic Control Devices (TEXAS MUTCD) for Streets and Highways.

Suitable warning signs shall be placed near the beginning of the worksite and well ahead of the worksite for alerting approaching traffic from both directions. Small markers shall be placed along newly painted lines or freshly placed raised markers to control traffic and prevent damage to newly painted surfaces or displacement of raised pavement markers. Painting equipment shall be marked with large warning signs indicating slow-moving painting equipment in operation.

1.4.3 Maintenance of Traffic

1.4.3.1 Roads, Streets, and Parking Areas

When traffic must be rerouted or controlled to accomplish the work, the necessary warning signs, flagpersons, and related equipment for the safe passage of vehicles shall be provided.

1.5 DELIVERY, STORAGE, AND HANDLING

All materials shall be delivered and stored in sealed containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's name, and directions, all of which shall be plainly legible at time of use.

1.6 ENVIRONMENTAL REQUIREMENTS

Pavement surface shall be free of snow, ice, or slush. Surface temperature shall be at least 40 degrees F and rising at the beginning of operations, except those involving shot or sand blasting. Operation shall cease during thunderstorms. Operation shall cease during rainfall, except for waterblasting and removal of previously applied chemicals. Waterblasting shall cease where surface water accumulation alters the effectiveness of material removal.

PART 2 PRODUCTS

2.1 PAINT

The paint shall be homogeneous, easily stirred to smooth consistency, and shall show no hard settlement or other objectionable characteristics during a storage period of 6 months. Paints for airfields, roads, parking areas, and streets shall conform to FS TT-P-1952, color as indicated. Paint is to be used only on temporary pavement markings, or as indicated in the drawings. Pavement marking paints shall comply with applicable state and local laws enacted to ensure compliance with Federal Clean Air Standards. Paint materials shall conform to the restrictions of the local Air Pollution Control District.

2.2 THERMOPLASTIC COMPOUNDS

The thermoplastic reflectorized pavement marking compound shall be extruded or sprayed in a molten state onto a primed pavement surface. Following a surface application of glass beads and upon cooling to normal pavement temperatures, the marking shall be an adherent reflectorized strip of the specified thickness and width that is capable of resisting deformation by traffic.

2.2.1 Composition Requirements

The binder component shall be formulated as a hydrocarbon resin. The pigment, beads and filler shall be uniformly dispersed in the binder resin. The thermoplastic composition shall be free from all skins, dirt, and foreign objects and shall comply with the following requirements:

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Component	Percent by Weight	
	White	Yellow
Binder	17 min.	17 min.
Titanium dioxide	10 min.	-
Glass beads,	20 min.	20 min.
Calcium carbonate & inert fillers	49 max.	*
Yellow pigments	-	*

*Amount and type of yellow pigment, calcium carbonate and inert fillers shall be at the option of the manufacturer, providing the other composition requirements of this specification are met.

2.2.2 Physical Properties

2.2.2.1 Color

The color shall be as indicated.

2.2.2.2 Drying Time

When installed at 70 degrees F and in thicknesses between 1/8 and 3/16 inch, after curing 15 minutes.

2.2.2.3 Softening Point

The composition shall have a softening point of not less than 194 degrees F when tested in accordance with ASTM E 28.

2.2.2.4 Specific Gravity

The specific gravity of the composition shall be between 1.9 and 2.2 as determined in accordance with ASTM D 792.

2.2.3 Portland Cement Concrete Primer

The primer for Portland cement concrete pavements shall be an epoxy resin primer. The primer shall be of the type recommended by the manufacturer of the thermoplastic composition. Epoxy primers recommended by the manufacturer shall be approved by the Contracting Officer prior to use. Requests for approval shall be accompanied with technical data, instructions for use, and a 1 quart sample of the primer material.

2.3 PREFORMED TAPE

The preformed tape shall be an adherent reflectorized strip in accordance with ASTM D 4505 Type I or IV, Class optional.

2.4 REFLECTIVE MEDIA

Reflective media for roads and streets shall conform to FS TT-B-1325, Type I, Gradation A or AASHTO M 247, Type I.

2.5 SAMPLING AND TESTING

Materials proposed for use shall be stored on the project site in sealed and labeled containers, or segregated at source of supply, sufficiently in advance of needs to allow 60 days for testing. Upon notification by the Contractor that the material is at the site or source of supply, a sample shall be taken by random selection from sealed containers in the presence of the Contracting Officer. Samples shall be clearly identified by designated name, specification number, batch number, manufacturer's formulation number, project contract number, intended use, and quantity involved.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Thoroughly clean surfaces to be marked before application of the pavement marking material. Dust, dirt, and other granular surface deposits shall be removed by sweeping, blowing with compressed air, rinsing with water or a combination of these methods as required. Rubber deposits, surface laitance, existing paint markings, and other coatings adhering to the pavement shall be completely removed with scrapers, wire brushes, sandblasting, approved chemicals, or mechanical abrasion as directed. Areas of old pavement affected with oil or grease shall be scrubbed with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinsed thoroughly after each application. After cleaning, oil-soaked areas shall be sealed with cut shellac to prevent bleeding through the new paint. Pavement surfaces shall be allowed to dry, when water is used for cleaning, prior to striping or marking. Surfaces shall be recleaned, when work has been stopped due to rain.

3.1.1 Pretreatment for Early Painting

Where early painting is required on rigid pavements, apply a pretreatment with an aqueous solution, containing 3 percent phosphoric acid and 2 percent zinc chloride, to prepared pavement areas prior to painting.

3.1.2 Cleaning Existing Pavement Markings

In general, markings shall not be placed over existing pavement marking patterns. Remove existing pavement markings, which are in good condition but interfere or conflict with the newly applied marking patterns. Deteriorated or obscured markings that are not misleading or confusing or interfere with the adhesion of the new marking material do not require removal. New preformed and thermoplastic pavement markings shall not be applied over existing preformed or thermoplastic markings. Whenever grinding, scraping, sandblasting or other operations are performed the work must be conducted in such a manner that the finished pavement surface is not damaged or left in a pattern that is misleading or confusing. When these operations are completed the pavement surface shall be blown off with compressed air to remove residue and debris resulting from the cleaning work.

3.1.3 Cleaning Concrete Curing Compounds

On new portland cement concrete pavements, cleaning operations shall not begin until a minimum of 30 days after the placement of concrete. All new concrete pavements shall be cleaned by either sandblasting or water blasting. When water blasting is performed, thermoplastic and preformed markings shall be applied no sooner than 24 hours after the blasting has been completed. The extent of the blasting work shall be to clean and prepare the concrete surface as follows:

- a. There is no visible evidence of curing compound on the peaks of the textured concrete surface.
- b. There are no heavy puddled deposits of curing compound in the valleys of the textured concrete surface.
- c. All remaining curing compound is intact; all loose and flaking material is removed.
- d. The peaks of the textured pavement surface are rounded in profile and free of sharp edges and irregularities.
- e. The surface to be marked is dry.

3.2 APPLICATION

All pavement markings and patterns shall be placed as shown on the plans.

3.2.1 Paint

Paint shall be applied to clean, dry surfaces, and only when air and pavement temperatures are above 40 degrees F and less than 95 degrees F. Paint temperature shall be maintained within these same limits. New asphalt pavement surfaces and new Portland concrete cement shall be allowed to cure for a period of not less than 30 days before applications of paint. Paint shall be applied pneumatically with approved equipment at rate of coverage specified. The contractor shall provide guide lines and templates as necessary to control paint application. Special precautions shall be taken in marking numbers, letters, and symbols. Edges of markings shall be sharply outlined.

3.2.1.1 Rate of Application

- a. Reflective Markings: Pigmented binder shall be applied evenly to the pavement area to be coated at a rate of 105 plus or minus 5 square feet/gallon. Glass spheres shall be applied uniformly to the wet paint on road and street pavement at a rate of 6 plus or minus 0.5 pounds of glass spheres per gallon of paint.
- b. Nonreflective Markings: Paint shall be applied evenly to the pavement surface to be coated at a rate of 105 plus or minus 5 square feet/gallon.

3.2.1.2 Drying

The maximum drying time requirements of the paint specifications will be strictly enforced to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. If there is a delay in drying of the markings, painting operations shall be discontinued until

cause of the slow drying is determined and corrected.

3.2.2 Thermoplastic Compounds

Thermoplastic pavement markings shall be placed upon dry pavement; surface dry only will not be considered an acceptable condition. At the time of installation, the pavement surface temperature shall be a minimum of 40 degrees F and rising. Thermoplastics, as placed, shall be free from dirt or tint.

3.2.2.1 Longitudinal Markings

All centerline, skipline, edgeline, and other longitudinal type markings shall be applied with a mobile applicator. All special markings, crosswalks, stop bars, legends, arrows, and similar patterns shall be placed with a portable applicator, using the extrusion method.

3.2.2.2 Primer

After surface preparation has been completed the concrete pavement surface shall be primed. The primer shall be applied with spray equipment. Primer materials shall be allowed to "set-up" prior to applying the thermoplastic composition. The Portland cement concrete primer shall be allowed to dry in accordance with the thermoplastic manufacturer's recommendations. To shorten the curing time of the epoxy resins an infrared heating device may be used on the concrete primer.

- a. Portland Cement Concrete Primer: Primer shall be applied to all concrete pavements (including concrete bridge decks) at a wet film thickness of between 0.04 to 0.05 inch (320-400 square feet/gallon).

3.2.2.3 Markings

After the primer has "set-up", the thermoplastic shall be applied at temperatures no lower than 375 degrees F nor higher than 425 degrees F at the point of deposition. Immediately after installation of the marking, drop-on glass spheres shall be mechanically applied so that the spheres are held by and imbedded in the surface of the molten material.

- a. Extruded Markings: All extruded thermoplastic markings shall be applied at the specified width and at a thickness of not less than 0.125 inch nor more than 0.190 inch.
- b. Sprayed Markings: All sprayed thermoplastic markings shall be applied at the specified width and the thicknesses designated in the contract plans. If the plans do not specify a thickness, centerline markings shall be applied at a wet thickness of 0.090 inch, plus or minus 0.005 inch, and edgeline markings at a wet thickness of 0.060 inch plus or minus 0.005 inch.
- c. Reflective Glass Spheres: Immediately following application, reflective glass spheres shall be dropped onto the molten thermoplastic marking at the rate of 1 pound/20 square feet of compound.

3.2.3 Preformed Tape

The pavement surface temperature shall be a minimum of 60 degrees F and the ambient temperature shall be a minimum of 60 degrees F and rising. The preformed markings shall be placed in accordance with the manufacturer's

written instructions.

3.2.4 Raised Reflective Markers

Prefabricated markers shall be aligned carefully at the required spacing and permanently fixed in place by means of epoxy resin adhesives. To insure good bond, pavement in areas where markers will be set shall be thoroughly cleaned by sandblasting and use of compressed air prior to applying adhesive.

3.2.5 Reflective Media

Application of reflective media shall immediately follow application of pigmented binder. Drop-on application of glass spheres shall be accomplished to insure that reflective media is evenly distributed at the specified rate of coverage. Should there be malfunction of either paint applicator or reflective media dispenser, operations shall be discontinued immediately until deficiency is corrected.

3.3 MARKING REMOVAL

Pavement marking, including plastic tape, shall be removed in the areas shown on the drawings. Removal of marking shall be as complete as possible without damage to the surface. Aggregate shall not be exposed by the removal process. After the markings are removed, the cleaned pavement surfaces shall exhibit adequate texture for remarking as specified in paragraph SURFACE PREPARATION. Contractor shall demonstrate removal of pavement marking in an area designated by the Contracting Officer. The demonstration area will become the standard for the remainder of the work.

3.3.1 Equipment Operation

Equipment shall be controlled and operated to remove markings from the pavement surface, prevent dilution or removal of binder from underlying pavement, and prevent emission of blue smoke from asphalt or tar surfaces.

3.3.2 Cleanup and Waste Disposal

The worksite shall be kept clean of debris and waste from the removal operations. Cleanup shall immediately follow removal operations in areas subject to air traffic. Debris shall be disposed of at approved sites.

-- End of Section --

SECTION 32 84 24

IRRIGATION SPRINKLER SYSTEMS

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PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN PETROLEUM INSTITUTE (API)

API Std 598 (2009) Valve Inspecting and Testing

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE Series 5000 (2009) Cross-Connection Control
Professional Qualification Standard

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C500 (2009) Metal-Seated Gate Valves for Water
Supply Service

AWWA C511 (2007) Standard for Reduced-Pressure
Principle Backflow Prevention Assembly

AWWA C651 (2005; Errata 2005) Standard for
Disinfecting Water Mains

AWWA C901 (2008) Polyethylene (PE) Pressure Pipe and
Tubing, 1/2 In. (13mm) Through 3 In. (76
mm), for Water Service

ASME INTERNATIONAL (ASME)

ASME B1.2 (1983; R 2007) Gages and Gaging for
Unified Inch Screw Threads

ASME B16.15 (2006) Cast Bronze Alloy Threaded Fittings
Classes 125 and 250

ASME B16.18 (2001; R 2005) Cast Copper Alloy Solder
Joint Pressure Fittings

ASME B16.22 (2001; R 2005) Standard for Wrought Copper
and Copper Alloy Solder Joint Pressure
Fittings

ASME B16.3 (2006) Malleable Iron Threaded Fittings,
Classes 150 and 300

ASME B40.100 (2005) Pressure Gauges and Gauge
Attachments

ASTM INTERNATIONAL (ASTM)

ASTM A 53/A 53M	(2007) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM B 32	(2008) Standard Specification for Solder Metal
ASTM B 43	(2009) Standard Specification for Seamless Red Brass Pipe, Standard Sizes
ASTM B 88	(2009) Standard Specification for Seamless Copper Water Tube
ASTM D 1785	(2006) Standard Specification for Poly(Vinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2241	(2009) Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 2287	(1996; R 2001) Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
ASTM D 2464	(2006) Standard Specification for Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2466	(2006) Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D 2564	(2004e1) Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 2774	(2008) Underground Installation of Thermoplastic Pressure Piping
ASTM D 2855	(1996; R 2002) Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D 3261	(2003) Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
ASTM F 441/F 441M	(2009) Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH
(FCCCHR)

FCCCHR List (continuously updated) List of Approved
Backflow Prevention Assemblies

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2008; AMD 1 2008) National Electrical Code

NSF INTERNATIONAL (NSF)

NSF/ANSI 14 (2008e) Plastics Piping System Components
and Related Materials

PLASTICS PIPE INSTITUTE (PPI)

PPI TN8/8 (1973) Making Threaded Joints with
Thermoplastic Pipe & Fittings

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS A-A-51145 (Rev D) Flux, Soldering, Non-Electronic,
Paste and Liquid

UNDERWRITERS LABORATORIES (UL)

UL 651 (2005; R 2006 thru 2008) Standard for
Schedule 40 and 80 Rigid PVC Conduit and
Fittings

1.2 SYSTEM DESCRIPTION

This system is designed with a water pressure minimum of 60 pounds per square inch (psi) maximum of 85 psi at connection to main meter and 30 psi at the last head in each zone. If pressure falls above or below indicated values, Contractor shall notify Contracting Officer. For Irrigation Sprinkler System, indicate the following:

- a. Head, piping, valve, controller, layout.
- b. Pipe, valve, backflow preventer, and controller.
- c. Water source equipment, including existing mains, piping, valves and meters.
- d. System and supply pressures.
- e. Indicate wiring diagram between existing power source and controller/water pump.
- f. Number and extent of control valve circuits.
- g. Provide details of all irrigation components and accessories.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When

used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Irrigation sprinkler system

Drawings including irrigation legend prepared by a licensed, registered or certified Landscape Architect or Irrigation Specialist.

SD-03 Product Data

Piping materials, tubing, and fittings

Valves and accessories

Sprinkler heads

Backflow preventers

Automatic controller

Solvent cement

Control wiring

Drip irrigation equipment and accessories

Water meter

Tapping tee

Valve boxes and lids

Drip head accessories

SD-06 Test Reports

Valves, and accessories tests

Backflow preventers

Pressure test

Operation test

Including verification of sprinkler head layout

Submit record of pressure tests conducted on recording gage.

SD-07 Certificates

Backflow preventers

ASSE Series 5000, Submit a certificate of Full Approval or a current Certificate of Approval from FCCCHR List for size, and make of backflow preventer being provided for this project. A

Certificate of Provisional Approval will not be acceptable.

SD-08 Manufacturer's Instructions

Automatic controller

Sprinkler heads

Piping materials

Tubing and fittings.

Backflow preventers

Valves

Solvent cement

Control wiring

Drip irrigation and accessories

Water meter

Submit mounting details for automatic controllers.

SD-10 Operation and Maintenance Data

Piping materials and fittings, Data Package 2; G

Sprinkler heads and accessories, Data Package 2; G

Backflow preventers, Data Package 2; G

Valves, Data Package 2; G

Automatic controller, Data Package 2; G

Drip irrigation and accessories, Data Package 2; G

Water meter, Data Package 2; G

Submit operation and maintenance data in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA. Include troubleshooting procedures with respect to valve and controller problems.

SD-11 Closeout Submittals

Controller Charts

Station Information List

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery

Deliver materials in original rolls, packages, cartons, and containers with the name of manufacturer, brand, and model. Inspect materials delivered to the site for damage.

1.4.2 Storage

Store materials on site in enclosures or under protective covering. Store plastic piping and rubber gaskets under cover out of direct sunlight. Do not store materials directly on ground. Keep inside of pipes and fittings free from dirt and debris.

1.4.3 Handling

Handle and carry pipe, fittings, valves, and accessories in such a manner as to ensure delivery to trench in sound undamaged condition. Do not drag pipe.

1.5 EXTRA STOCK

- a. 2 additional sprinkler heads (nozzles, bodies, screens, pressure compensating devices) of each size and type;
- b. 2 valve keys for operating manual valves;
- c. 2 wrenches for removing and installing each type of head;
- d. 2 quick coupler keys and hose swivels;
- e. 4 irrigation controller housing keys.
- f. 4 irrigation controller enclosure keys; and

1.6 QUALITY ASSURANCE

1.6.1 Required Test

Submit tests signed by an authorized official of a testing laboratory of sprinkler head, valve, automatic controller, emitter heads, vacuum breaker, backflow preventer, and water hammer arrester.

1.6.2 Contractor Qualifications

Contractor shall have a qualified Rain Bird Maxicom certified installer to perform all Maxicom communication equipment installation.

1.7 WARRANTY

1.7.1 Contractors Warranty and Maintenance

- a. Contractor shall provide a full warranty of the irrigation system for a period of 1 year from the date of final acceptance of work to include all operation, maintenance and central control communication of the complete irrigation system as described in the plans and specifications.
- b. Warranty shall include all manufacturers' warranties against defects of material and equipment.
- c. Warranty shall include a guarantee against all defects of installation.

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PART 2 PRODUCTS

2.1 PIPING MATERIALS

2.1.1 Copper Tubing and Associated Fittings

2.1.1.1 Tubing

ASTM B 88, Type K.

2.1.1.2 Fittings

ASME B16.22 and ASME B16.18, solder joint. Solder, ASTM B 32 alloy Grade Sn95 or Sn94. Flux, FS A-A-51145, Type I.

2.1.2 Red Brass Pipe and Associated Fittings

2.1.2.1 Pipe

ASTM B 43, regular.

2.1.2.2 Fittings

ASME B16.15, Class 250, cast bronze threaded.

2.1.3 Galvanized Steel Pipe and Associated Fittings

2.1.3.1 Pipe

ASTM A 53/A 53M, Schedule 40.

2.1.3.2 Fittings

ASME B16.3, Class 150.

2.1.4 Polyvinyl Chloride (PVC) Pipe, Fittings and Solvent Cement

NSF/ANSI 14, seal of approval for potable water.

2.1.4.1 Pipe

ASTM D 1785, PVC 1120 Schedule 40 ; or ASTM D 2241, PVC 1120 SDR 21, Class 315 and Class 200.

2.1.4.2 Fittings

a. Solvent Welded Socket Type: ASTM D 2466, Schedule 40.

b. Threaded Type: ASTM D 2464, Schedule 80.

2.1.4.3 Solvent Cement

ASTM D 2564.

2.1.5 Polyethylene (PE) Plastic Piping

2.1.5.1 Pipe

AWWA C901, outside diameter (od) base with dimension ratio (DR) of 9.3 to

provide 150 psi minimum pressure rating.

2.1.5.2 Fittings

ASTM D 3261, DR of 9.3.

2.1.6 Dielectric Fittings

ASTM F 441/F 441M, Schedule 80, CPVC threaded pipe nipples, 4 inch length.

2.1.7 Drip Irrigation Tubing

ASTM D 2287, maximum inside diameter (id) of 1/2 inch, vinyl plastic extruded from non-rigid chloride, integrally algae-resistant, homogeneous throughout, smooth inside and outside, free from foreign materials, cracks, serrations, blisters and other effects. Provide barbed fittings.

2.1.8 Pipe Sleeving

- a. Provide PVC piping two times the diameter of main or lateral piping.
- b. Provide grey PVC electrical conduit sized according to number of control wires. Minimum 2 inch size.

2.2 IRRIGATION AND DRIP SPRINKLER HEADS

2.2.1 In-Line Drip Emitter

Factory installed, integral with drip pipe tubing, pressure compensating, self-cleaning emitters with built-in check valve at spacings of 12 inches. Emitter flow of 0.9 gph with inlet pressure of 30 psi. System pressure of 15 psi minimum to 50 psi maximum.

2.3 VALVES

2.3.1 Isolation Valve

2.3.1.1 Ball Valves, Less than 3 Inches

API Std 598, plastic body, threaded ends.

2.3.2 Control Valves

2.3.2.1 Remote Control Valve, Electrical

Solenoid actuated globe valves of 1". 1 1/2" or 2" in size, alternating current (ac), 50/60 HZ 24V, glass filled nylon construction slow closing, normally closed with fabric reinforced diaphragm. Provide plastic valve housing suitable for service at 150 psi operating pressure.

2.3.3 Quick Coupling Valves

Two piece unit consisting of a coupler water seal valve assembly and a removable upper body to allow spring and key track to be serviced without shutout of main. Provide brass parts. Provide lavender, vinyllockable lids with springs for positive closure on key removal. Lid shall have international non-potable warning symbol and "Do Not Drink" imprinted in Spanish and English.

2.3.4 Backflow Preventers

2.3.4.1 Reduced Pressure Type Backflow Preventers

AWWA C511. Provide backflow preventers complete with 150 psi rated flanged , bronze mounted ball valve and strainer, stainless steel or bronze, internal parts. Total pressure drop through complete assembly shall be a maximum of 12 psi at rated flow. Listing of particular make, model/design, and size in FCCCHR List will be acceptable as required proof for testing and certification.

- a. Piping Assembly: Red brass pipe and fittings.
- b. Strainers: Bronze or brass construction with gasket caps. Equip units with No. 200 mesh stainless steel screen elements.

2.4 ACCESSORIES AND APPURTENANCES

2.4.1 Tapping Tee

Bronze flat, double strap, with neoprene gasket or "O"-ring seal.

2.4.2 Water Meter

Meter to include roll sealed register, magnetic drive, straight reading (odometer shall indicate in gallons, large numerals, glass lens for legibility,) low flow indicator to detect leaks, tamper proof seal pin to detect theft; sturdy durable, corrosion resistant main case, electrical grounding continuity; nutating disc measuring chamber with minimum head loss. Water meter to be approved by Fort Bliss Directorate of Public Works.

2.4.3 Drip Head Accessories

2.4.3.1 Strainer

Provide strainer at inlet to each drip control valve assembly. Provide polyester fabric screen attached to a PVC frame having the equivalent of 200 mesh filtration capacity. Compact "Y" body and cap configuration.

2.4.3.2 Tubing Stakes

Plastic, plastic coated steel, or other non-corrosive strong material to secure tubing.

2.4.3.3 Line Flushing Valve

Construct of PVC with maximum flow rate of 15 gpm with minimum flushing water volume of one gallon at a minimum 4 psi to a maximum 25 psi at a point of discharge.

2.4.3.4 Valve Boxes

Plastic valve box for each isolation valve, control valve and quick coupling valve. Provide box sizes that are suitable and adjustable for valve used.

2.4.4 Backflow Preventer Accessories

2.4.4.1 Pressure Gages

ASME B40.100, single style pressure gage for water with 4 1/2 inch dial, brass or aluminum case, bronze tube, gage cock, pressure snubber, and siphon. Provide scale range suitable for irrigation systems.

2.4.4.2 Backflow Preventer Enclosure

5052-H32 marine grade aluminum enclosure with vandal proof lockable lift-off cover insulated to provide freeze protection and mounted securely to concrete pad. Lock for enclosure provided by others. Enclosure shall be approved by the owner.

2.4.4.3 Concrete Pads

Cast-in-place reinforced concrete construction for reduced pressure type backflow preventers.

2.4.5 Flow Meter

1.5 inch pvc flow meter with a minimum 5 gpm, maximum 100 gpm. Provide pulse transmitter and pulse decoder (for two wire satellite system) and/or pulse transmitter without decoder (for ESP site satellite system).

2.5 Automatic Controller

2.5.1 Satellite Controller

- a. 12, 24 or 40 station field satellite controller for central control system or site satellite system.
- b. Stand-alone capability
- c. Two master valve terminals, one programmable by station.
- d. Capable of program overlapping.
- e. Capable of being modified to mount in stainless steel pedestal cabinet.

2.6 ELECTRICAL CIRCUITS

2.6.1 Control Wiring for Electrically Operated Valves

NFPA 70, copper conductor 12 and 14 gage wire, Type UF. PVC or PE direct burial jacket.

2.6.2 Conduit

UL 651, rigid polyvinyl chloride conduit, Schedule 40.

2.7 CONCRETE MATERIALS

2500 psi compressive concrete strength at 28 days as specified under Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE.

2.8 CENTRAL CONTROL SYSTEM

2.8.1 Central Control Computer

- a. Contractor shall verify that the owner's current Maxicom Central Control Computer System is in operation and working properly accordingly to manufacturer's recommendations.
- b. Contractor shall be responsible for the proper connection and communication of all Maxicom devices under this contract.

2.8.1.1 Cluster Control Unit CCU Interface

- a. CCU shall communicate with satellite controllers via 2-wire path of PE-39 communication cable carried in rigid conduit.
- b. System is designed without any splices in communication system and splices shall be made only when absolutely necessary. When splices are required they shall be made with water-proof sealed connections.

PART 3 EXECUTION

3.1 INSTALLATION

Install sprinkler system after site grading has been completed.

3.1.1 Trenching

Hand trench around roots to pipe grade when roots of 2 inches diameter or greater are encountered. Make width of trench 4 inches minimum or 1 1/2 times diameter of pipe, whichever is wider. Backfill and hand tamp over excavation. When rock is encountered, excavate 4 inches deeper and backfill with silty sand (SM) or well-graded sand (SW) to pipe grade. Keep trenches free of obstructions and debris that would damage pipe. Do not mix subsoil with topsoil. Bore under existing concrete walks, drives and other obstacles at a depth conforming to bottom of adjacent trenches. Install pipe sleeve, two pipe diameters larger than sprinkler pipe, to fill bore.

3.1.2 Piping System

3.1.2.1 Clearances

- a. Minimum horizontal clearances between lines: 4 inches for 2 inch pipe and less; 12 inches for 2 inch pipe and more.
- b. Minimum vertical clearances between lines: One inch.

3.1.2.2 Minimum Backfill Cover

- a. 18 inches for pressure mainline pipe and valve control wire.
- b. 12 inches for non-pressure lateral pipe.

3.1.2.3 Restoration

Fill top 3 inches with topsoil and compact with same density as surrounding soil. Restore plants according to Section 32 93 00 EXTERIOR PLANTS.

3.1.2.4 Sterilization

Sprinkler system fed from a potable water system sterilized upstream of backflow preventer in accordance with AWWA C651. Sterilize new water lines for a minimum of 24 hours to meet local health test requirements before placing in service. Minimum retention period shall be 3 hours.

3.1.3 Piping Installation

3.1.3.1 Polyvinyl Chloride (PVC) Pipe

- a. Solvent-Cemented Joints: ASTM D 2855.
- b. Threaded Joints: PPI TN8/8; full cut with a maximum of three threads remain exposed on pipe and nipples. Make threaded joints tight without recourse to wicks or fillers, other than polytetrafluoroethylene thread tape.
- c. Piping: ASTM D 2774 or ASTM D 2855, and pipe manufacturer's instructions. Install pipe in a serpentine (snaked) manner to allow for expansion and contraction in trench before backfilling. Install pipes at temperatures over 40 degrees F.

3.1.3.2 Soldered Copper Tubing

Ream pipe and remove burrs. Clean and polish contact surfaces of joint. Flux both male and female ends. Insert end of tube into fittings full depth of socket. After soldering, a solder bead shall show continuously around entire joint circumference. Remove excess acid flux from tubings and fittings.

3.1.3.3 Threaded Brass or Galvanized Steel Pipe

Prior to installation ream pipe. Cut threads as specified in ASME B1.2. Make joints with pipe joint compound applied to male end only.

3.1.3.4 Polyethylene (PE) Pipe and Drip Tubing

Bury drip tubing 2 to 4 inches deep. Barbed connection in accordance with manufacturers recommendation. When cutting hose, use a shearing tool such as a pipe cutter, knife or shears. Use only manufacturer's recommended tool and procedure when installing drip tubing.

3.1.3.5 Dielectric Protection

Where pipes of dissimilar metal are joined, make connection with dielectric fitting.

3.1.4 Valves

3.1.4.1 Isolation Valves

Install in a valve box extending from grade to below valve body, with a minimum of 4 inches cover measured from finish grade to top of valve stem.

3.1.4.2 Control Valves

Plumb valve in a valve box extending from grade to below valve body, with minimum of 4 inch cover measured from grade to top of valve. Install

automatic valves beside sprinkler heads with a valve box.

3.1.4.3 Quick Coupling Valves

Install in a valve box extending from grade to below valve body, with a minimum of 4 inches cover measured from finish grade to top of valve stem.

3.1.5 Backflow Preventers

- a. Install backflow preventer in new connection to existing water distribution system, between connection and control valves. Install with concrete pads.
- b. Flush pipe lines prior to installing device.
- c. Device shall not be installed in pits or where any part of the device could become submerged in standing water
- d. Install device a minimum of 12 inches from trees, walls, fences, structures and other obstructions.

3.1.5.1 Reduced Pressure Backflow Preventer

- a. Protect device by a strainer located upstream.
- b. Install device a minimum of 12 inches between finish grade and bottom of relief port.

3.1.6 Accessories

3.1.6.1 Connection To Existing Water Supply Systems (Tapping Tee)

Use tapping or drilling machine valve and mechanical joint type sleeves for connections to be made under pressure. Bolt sleeves around mains; bolt valve conforming to AWWA C500 to the branch. Open valve, attach drilling machine, make tap, close valve, and remove drilling machine, without interruption of service. Notify Contracting Officer in writing at least 15 days prior to the date the connections are required; receive approval before any service is interrupted. Provide materials required to make connections into the existing water supply systems and perform excavating, backfilling, and other incidental labor as required. Furnish the labor and the tapping or drilling machine for making the actual connections to the existing systems.

3.1.6.2 Water Meter

Install meter upstream of backflow preventer per manufacturer's recommendations and local PWC Utility Department Instructions.

3.1.6.3 Valve Boxes and Lids

- a. Install with one cu ft pea gravel sump below valve.
- b. Support valve box with brick .
- c. For turf areas, install flush with finish grade.
- d. For non-turf areas, install 1 inch above finish grade.

- e. For sloped conditions, install valve box level with terrain.

3.1.6.4 Backflow Preventer Enclosure

- a. Install with concrete pad.
- b. Place hinges so direction of swing will not conflict with other site features.

3.1.6.5 Air/Vacuum Relief Valve

Locate at highest point in dip tube piping system (1) minimum for each drip zone installed, unless drip tubing with built-in check valves are used.

3.1.7 Electrical Circuits

Bury wires beside mainline pipe in same trench. Provide grey electrical conduit where wires run under paved or non-paved pedestrian paths and vehicular roads. Tag wires at controller and control valve location with plastic tie wrapped tags. Provide one control wire to each control valve location and one common wire looped from controller to each control valve. provide one separate control valve wire of a different color from controller to each control valve cluster.

3.1.7.1 Loops

Provide a 24 inch loop of wire at each valve where controls are connected.

3.1.7.2 Expansion and Contraction

Bundle multiple tubes or wires and tape together at 10 foot intervals with 24 inch loop for expansion and contraction.

3.1.7.3 Splices

Make electrical splices waterproof. Locate all field electrical splices in valve boxes.

3.1.8 Automatic Controller

Determine exact location of controllers in field before installation. Coordinate the electrical service to these locations. Install in accordance with manufacturer's recommendations and NFPA 70.

3.1.9 Flushing

After piping, risers, and valves are in place and connected, but prior to installation of sprinkler heads and valves, flush piping system under a full head of water. Maintain flushing for 3 minutes.

3.1.10 Adjustment

After grading, plant installation, and rolling of planted areas, adjust sprinkler heads flush with finished grade. Make adjustments by providing new nipples of proper length or by use of heads having an approved device, integral with head, which will permit adjustment in height of head without changing piping.

3.1.11 Sterilization

Sprinkler system fed from a potable water system shall be sterilized upstream of backflow preventer in accordance with AWWA C651. Sterilize new waterlines for a minimum of 24-hours, to meet local, , , health test requirements before placing in service. Minimum retention period shall be 3 hours.

3.2 FIELD QUALITY CONTROL

The Contractor will conduct and the Contracting Officer and the QC representative will witness field inspections and field tests specified in this section. Perform field tests, and provide labor, equipment, and incidentals required for testing.

3.2.1 Pressure Test

3.2.1.1 Duration

During pressure test, maintain a hydrostatic pressure of 150 psi without pumping for a period of one hour with an allowable pressure drop of 5 psi before backfilling system.

3.2.1.2 Leaks

Correct leaks. Make necessary corrections to stop leakage.

3.2.1.3 Retest

Retest system twice until pressure can be maintained for duration of test.

3.2.2 Operation Test

3.2.2.1 Accessories

At conclusion of pressure test, install irrigation heads or drip heads, quick coupling assemblies, and hose bib, and test entire system for operation under normal operating pressure. Make necessary corrections or adjustments to raise or lower pressure for each system if tests results do not match pressure requirements.

3.2.2.2 Acceptance

Operation test is acceptable if system operates through at least one complete cycle for areas to be irrigated.

3.2.3 Deliverables

- a. Controller Charts: Provide one chart for each controller supplied. Indicate in chart area controlled by automatic controller. The chart is a reduction of the actual plans that will fit the maximum dimensions inside controller housing. Use black line print for chart and a

different pastel or transparent color to indicate each station area of coverage. After chart is completed and approved for final acceptance, seal chart between two 20 mil pieces of clear plastic.

- b. Station Information List: Provide list of information including each station for each controller installed with valve number, controller number, ccu-number, flow (gpm) and plant type.

-- End of Section --

SECTION 32 93 00

EXTERIOR PLANTS

07/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A300 (1995) Tree Care Operations - Trees, Shrubs and Other Woody Plant Maintenance

ANSI Z60.1 (2004) Nursery Stock

ASTM INTERNATIONAL (ASTM)

ASTM A 580/A 580M (2008) Standard Specification for Stainless Steel Wire

ASTM D 4972 (2001; R 2007) pH of Soils

L.H. BAILEY HORTORIUM (LHBH)

LHBH (1976) Hortus Third

TREE CARE INDUSTRY ASSOCIATION (TCIA)

TCIA Z133.1 (2006) American National Standard for Arboricultural Operations - Pruning, Repairing, Maintaining, and Removing Trees, and Cutting Brush - Safety Requirements

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED (2002; R 2005) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)

1.2 RELATED REQUIREMENTS

Section 31 00 00 EARTHWORK, Section 32 84 24 IRRIGATION SPRINKLER SYSTEMS, and Section 32 05 33 LANDSCAPE ESTABLISHMENT applies to this section for pesticide use and plant establishment requirements, with additions and modifications herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office

that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

State Landscape Contractor's License

Time Restrictions and Planting Conditions

Indicate anticipated dates and locations for each type of planting.

SD-03 Product Data

Local/Regional Materials; (LEED)

Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

Peat

Submit documentation indicating type of biobased material in product and biobased content. Indicate relative dollar value of biobased content products to total dollar value of products included in project.

Mulch; G

Hose; (LEED)

Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

Fertilizer

Weed control fabric; G

Root control barrier; G

Staking Material

Plastic Edging

Submit documentation certifying products are from salvaged/recovered lumber sources and indicating percentage of salvaged/recovered content per unit of product.

Metal anchors

Antidesiccants

Erosion control materials

SD-04 Samples

Decomposed Granite; G

Mulch; G

Submit one pint of mulch.

SD-06 Test Reports

Topsoil composition tests; Soil Test of current growing area; Soil Test of proposed area; Soil Test location map

Percolation Test; Percolation Test of current growing area; Percolation Test of proposed area

SD-07 Certificates

Nursery certifications

Indicate names of plants in accordance with the LHBH, including type, quality, and size.

1.4 QUALITY ASSURANCE

1.4.1 Topsoil Composition Tests

Commercial test from an independent testing laboratory including basic soil groups (moisture and saturation percentages, Nitrogen-Phosphorus-Potassium (N-P-K) ratio, pH (ASTM D 4972), soil salinity), secondary nutrient groups (calcium, magnesium, sodium, Sodium Absorption Ratio (SAR)), micronutrients (zinc, manganese, iron, copper), toxic soil elements (boron, chloride, sulfate), cation exchange and base saturation percentages, and soil amendment and fertilizer recommendations with quantities for plant material being transplanted. Soil required for each test shall include a maximum depth of 18 inches of approximately 1 quart volume for each test. Areas sampled should not be larger than 1 acre and should contain at least 6-8 cores for each sample area and be thoroughly mixed. Problem areas should be sampled separately and compared with samples taken from adjacent non-problem areas. The location of the sample areas should be noted and marked on a parcel or planting map for future reference.

1.4.2 Nursery Certifications

a. Indicate on nursery letterhead the name of plants in accordance with the LHBH, including botanical common names, quality, and size.

b. Inspection certificate.

1.4.3 State Landscape Contractor's License

Construction company shall hold a landscape contractors license in the state where the work is performed and have a minimum of five years landscape construction experience. Submit copy of license and three references for similar work completed in the last five years.

1.4.4 Plant Material Photographs

Contractor shall submit nursery photographs, for government approval prior to ordering, for each tree larger than 24-inch box/ 2-inch caliper size.

1.4.5 Percolation Test

Immediately following rough grading operation, identify a typical location for one of the largest trees and or shrubs and excavate a pit per the project details. Fill the pit with water to a depth of 12 inches. The length of time required for the water to percolate into the soil, leaving the pit empty, shall be measured and verified by the Contracting Officer.

Within six hours of the time the water has drained from the pit, the Contractor, with the Contracting Officer, shall again fill the pit with water to a depth of 12 inches. If the water does not completely percolate into the soil within 9 hours, a determination shall be made whether a drainage system or a soil penetrant will be required for each tree and or shrub being transplanted.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

1.5.1.1 Branched Plant Delivery

Deliver with branches tied and exposed branches covered with material which allows air circulation. Prevent damage to branches, trunks, root systems, and root balls and desiccation of leaves.

1.5.1.2 Soil Amendment Delivery

Deliver to the site in original, unopened containers bearing manufacturer's chemical analysis, name, trade name, or trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer, iron, and compost may be furnished in bulk with a certificate indicating the above information. Store in dry locations away from contaminants.

1.5.1.3 Plant Labels

Deliver plants with durable waterproof labels in weather-resistant ink. Provide labels stating the correct botanical and common plant name and variety as applicable and size as specified in the list of required plants. Attach to plants, bundles, and containers of plants. Groups of plants may be labeled by tagging one plant. Labels shall be legible for a minimum of 60 days after delivery to the planting site.

1.5.2 Storage

1.5.2.1 Plant Storage and Protection

Store and protect plants not planted on the day of arrival at the site as follows:

- a. Shade and protect plants in outside storage areas from the wind and direct sunlight until planted.
- b. Heel-in bare root plants.
- c. Protect balled and burlapped plants from freezing or drying out by covering the balls or roots with moist burlap, sawdust, wood chips, shredded bark, peat moss, or other approved material. Provide covering which allows air circulation.
- d. Keep plants in a moist condition until planted by watering with a fine mist spray.
- e. Do not store plant material directly on concrete or bituminous surfaces.

1.5.2.2 Fertilizer, compost, decomposed granite, and Mulch Storage

Store in dry locations away from contaminants.

1.5.2.3 Topsoil

Prior to stockpiling topsoil, eradicate on site undesirable growing vegetation. Clear and grub existing vegetation three to four weeks prior to stockpiling existing topsoil.

1.5.2.4 Weed Control Fabric

Store materials on site in enclosures or under protective covering in dry location. Store under cover out of direct sunlight. Do not store materials directly on ground.

1.5.3 Handling

Do not drop or dump plants from vehicles. Avoid damaging plants being moved from nursery or storage area to planting site. Handle boxed, balled and burlapped, bare root, balled and potted, in-ground fabric bag grown, container, plants carefully to avoid damaging or breaking the earth ball or root structure. Do not handle plants by the trunk or stem. Puddle bare-root plants after removal from the heeling-in bed to protect roots from drying out. Remove damaged plants from the site.

1.5.4 TIME LIMITATION

Except for container-grown plant material, the time limitation from digging to installing plant material shall be a maximum of 90 days. The time limitation between installing the plant material and placing the mulch shall be a maximum of 24 hours.

1.6 TIME RESTRICTIONS AND PLANTING CONDITIONS

Coordinate installation of planting materials during optimal planting seasons for each type of plant material required.

1.6.1 Planting Dates

Plant all plants from Oct 1 to June 1.

1.6.1.1 Deciduous Material

Deciduous material from Feb 1 to June 1 for spring /summer planting and from Oct 1 to Dec 1 for fall /winter planting.

1.6.1.2 Evergreen Material

Evergreen material from Feb 1 to June 1 for spring /summer planting and from Oct 1 to Dec 1 for fall /winter planting.

1.6.2 Restrictions

Do not plant when ground is frozen, snow covered, muddy, or when air temperature exceeds 90 degrees Fahrenheit

1.7 GUARANTEE

All plants shall be guaranteed for one year beginning on the date of inspection by the Contracting Officer to commence the plant establishment period, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by the Government or by weather conditions unusual for the warranty period.

1.8 SUSTAINABLE DESIGN REQUIREMENTS

1.8.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources. Landscaping materials may be locally available.

PART 2 PRODUCTS

2.1 PLANTS

2.1.1 Regulations and Varieties

Furnish nursery stock in accordance with ANSI Z60.1, except as otherwise specified or indicated. Each plant or group of planting shall have a "key" number indicated on the nursery certifications of the plant schedule. Furnish plants grown under climatic conditions similar to those in the locality of the project. Plants specified shall be indigenous, low maintenance varieties, tolerant of site's existing soils and climate. Spray plants budding into leaf or having soft growth with an antidesiccant before digging. Plants of the same specified size shall be of uniform size and character of growth. Plants shall be chosen with their mature size and growth habit in mind to avoid over-planting and conflict with other plants, structures or underground utility lines. All plants shall comply with all Federal and State Laws requiring inspection for plant diseases and infestation.

2.1.2 Shape and Condition

Well-branched, well-formed, sound, vigorous, healthy planting stock free from disease, sunscald, windburn, abrasion, and harmful insects or insect eggs and having a healthy, normal, and undamaged root system.

2.1.2.1 Deciduous Trees and Shrubs

Symmetrically developed and of uniform habit of growth, with straight boles or stems, and free from objectionable disfigurements.

2.1.2.2 Evergreen Trees and Shrubs

Well developed symmetrical tops with typical spread of branches for each particular species or variety.

2.1.2.3 Ground Covers and Vines

Number and length of runners and clump sizes indicated, and of the proper age for the grade of plants indicated, furnished in removable containers, integral containers, or formed homogeneous soil section.

2.1.1.3 Plant Size

Minimum sizes measured after pruning and with branches in normal position, shall conform to measurements indicated, based on the average width or height of the plant for the species as specified in ANSI Z60.1. Plants larger in size than specified may be provided with approval of the Contracting Officer. When larger plants are provided, increase the ball of earth or spread of roots in accordance with ANSI Z60.1.

2.1.1.4 Root Ball Size

All box-grown, field potted, field boxed, collected, plantation grown, bare root, balled and burlapped, container grown, processed-balled, and in-ground fabric bag-grown root balls shall conform to ANSI Z60.1. All wrappings and ties shall be biodegradable. Root growth in container grown plants shall be sufficient to hold earth intact when removed from containers. Root bound plants will not be accepted.

2.1.1.5 Growth of Trunk and Crown

2.1.1.5.1 Deciduous Trees

A height to caliper relationship shall be provided in accordance with ANSI Z60.1. Height of branching shall bear a relationship to the size and species of tree specified and with the crown in good balance with the trunk. The trees shall not be "poled" or the leader removed.

- a. Single stem: The trunk shall be reasonably straight and symmetrical with crown and have a persistent main leader.
- b. Multi-stem: All countable stems, in aggregate, shall average the size specified. To be considered a stem, there shall be no division of the trunk which branches more than 6 inches from ground level.

2.1.1.5.2 Deciduous Shrubs

Deciduous shrubs shall have the height and number of primary stems recommended by ANSI Z60.1. Acceptable plant material shall be well shaped, with sufficient well-spaced side branches, and recognized by the trade as typical for the species grown in the region of the project.

2.1.1.5.3 Coniferous Evergreen Plant Material

Coniferous Evergreen plant material shall have the height-to-spread ratio recommended by ANSI Z60.1. The coniferous evergreen trees shall not be "poled" or the leader removed. Acceptable plant material shall be exceptionally heavy, well shaped and trimmed to form a symmetrical and tightly knit plant. The form of growth desired shall be as indicated.

2.1.1.5.4 Broadleaf Evergreen Plant Material

Broadleaf evergreen plant material shall have the height-to-spread ratio recommended by ANSI Z60.1. Acceptable plant material shall be well shaped and recognized by the trade as typical for the variety grown in the region of the project.

2.1.5.5 Ground Cover and Vine Plant Material

Ground cover and vine plant material shall have the minimum number of runners and length of runner recommended by ANSI Z60.1. Plant material shall have heavy, well developed and balanced crown with vigorous, well developed root system and shall be furnished in containers.

2.2 PLANTING SOIL MIXTURES

1 part topsoil, 1 part compost manure. Thoroughly mix all parts of planting soil mixture to a uniform blend throughout.

2.3 FERTILIZER

2.3.1 Granular Fertilizer

Organic, granular controlled release fertilizer containing the following minimum percentages, by weight, of plant food nutrients:

- 11 percent available nitrogen
- 2 percent available phosphorus
- 3 percent available potassium
- .32 percent sulfur
- .35 percent iron

2.3.2 Fertilizer Tablets

Organic, plant tablets composed of tightly compressed fertilizer chips forming a tablet that is insoluble in water, is designed to provide a continuous release of nutrients for at least 24 months and contains the following minimum percentages, by weight, of plant food nutrients:

- 20 percent available nitrogen
- 20 percent available phosphorus
- 5 percent available potassium

2.4 WEED CONTROL FABRIC

2.4.1 Roll Type Polypropylene or Polyester Mats

Fabric shall be woven, needle punched or non-woven and treated for protection against deterioration due to ultraviolet radiation. Fabric shall be minimum 99 percent opaque to prevent photosynthesis and seed germination from occurring, yet allowing air, water and nutrients to pass thru to the roots. Minimum weight shall be 5 ounces per square yard with a minimum thickness of 20 mils with a 20 year (minimum) guarantee.

2.5 MULCH

Free from noxious weeds, mold, pesticides, or other deleterious materials.

2.5.1 Inert Mulch Materials

Decomposed granite ranging in size from 3/4" to sandy fines. Compacted in 1" lifts maximum and top raked smooth. Provide materials from site and construction waste to the greatest extent possible. Mulch may contain post-consumer or post-industrial recycled content.

2.5.2 Organic Mulch Materials

Shredded hardwood from site when available. Biobased content shall be a minimum of 100 percent. Wood cellulose fiber shall be processed to contain no growth or germination-inhibiting factors, dyed with non-toxic, biodegradable dye to an appropriate color to facilitate visual metering of materials application. Paper-based hydraulic mulch shall contain a minimum of 100 percent post-consumer recycled content. Wood-based hydraulic mulch shall contain a minimum of 100 percent recycled material.

2.6 STAKING AND GUYING MATERIAL

2.6.1 Staking Material

2.6.1.1 Tree Support Stakes

Rough sawn FSC-certified or salvaged hard wood free of knots, rot, cross grain, bark, long slivers, or other defects that impair strength. Stakes shall be minimum 2 inches square or 2 1/2 inch diameter by 8 feet long, pointed at one end.

2.6.2 Guying Material

2.6.2.1 Guying Wire

12 gauge annealed galvanized steel, ASTM A 580/A 580M.

2.6.2.2 Guying Cable

Minimum five-strand, 3/16 inch diameter galvanized steel cable .

2.6.3 Hose Chafing Guards

New or used 2 ply 3/4 inch diameter reinforced rubber or plastic hose, black or dark green, all of same color.

2.6.4 Flags

White surveyor's plastic tape, 12 inches long, fastened to guying wires or cables.

2.6.5 Turnbuckles

Galvanized or cadmium-plated steel with minimum 3 inch long openings fitted with screw eyes. Eye bolts shall be galvanized or cadmium-plated steel with one inch diameter eyes and screw length 1 1/2 inches, minimum.

2.6.6 Deadmen

4 by 8 inch rectangular or 8 inch diameter by 36 inch long, pine wood material.

2.6.7 Metal Anchors

2.6.7.1 Driven Anchors

Malleable iron, arrow shaped, galvanized, sized as follows:

<u>Tree Caliper</u>	<u>Anchor Size</u>
2 inches and under	3 inches
3 to 6 inches	4 inches
6 to 8 inches	6 inches
8 to 10 inches	8 inches
10 to 12 inches	10 inches

2.6.7.2 Screw Anchors

Steel, screw type with welded-on 3 inch round helical steel plate, minimum 3/8 inch diameter, 15 inches long.

2.7 EDGING MATERIAL

2.7.1 Plastic Edging

Plastic edging shall be Permaloc "Onyx" plastic landscape edging manufactured by Permaloc Corporation 13505 Barry Street, Holland, Michigan 49424, USA, or approved equal. Plastic edging shall be shop fabricated, 065" x 4" in deep, plastic, black. Edging shall be furnished in 20' sections.

- a. Plastic edging shall have slotted holes to utilize (5) 8" steel stakes.
- b. Steel stakes shall be 8" long minimum.

2.8 ANTIDESICCANTS

Sprayable, water insoluble vinyl-vinledine complex which produce a moisture retarding barrier not removable by rain or snow. Film shall form at temperatures commonly encountered out of doors during planting season and have a moisture vapor transmission rate (MVT) of the resultant film of maximum 10 grams per 24 hours at 70 percent humidity.

2.9 EROSION CONTROL MATERIALS

Erosion control material shall conform to the following:

2.9.1 Erosion Control Fabric

Fabric shall be knitted construction of polypropylene yarn with uniform mesh openings 3/4 to 1 inch square with strips of biodegradable paper. Filler paper strips shall have a minimum life of 6 months.

2.9.2 Erosion Control Net

Net shall be heavy, twisted jute mesh, weighing approximately 1.22 pounds per linear yard and 4 feet wide with mesh openings of approximately 1 inch square.

2.9.3 Erosion Control Material Anchors

Erosion control anchors shall be as recommended by the manufacturer.

2.10 WATER

Source of water to be approved by Contracting Officer and suitable quality for irrigation and shall not contain elements toxic to plant life, including acids, alkalis, salts, chemical pollutants, and organic matter. Use collected storm water or graywater when available.

2.10.1 Hose

Hoses used for watering shall be a minimum of 60 percent post-consumer rubber or plastic.

2.11 SOURCE QUALITY CONTROL

The Contracting Officer will inspect plant materials at the project site and approve them. Tag plant materials for size and quality.

PART 3 EXECUTION

3.1 EXTENT OF WORK

Provide soil preparation, compost manure mixture, tree, shrub, vine, groundcover, and planting, edging, staking and guying, weed control fabric, erosion control material and root control barrier installation and a mulch topdressing of all newly graded finished earth surfaces, unless indicated otherwise, and at all areas inside or outside the limits of construction that are disturbed by the Contractor's operations.

3.2 PREPARATION

3.2.1 Protection

Protect existing and proposed landscape features, elements, and sites from damage or contamination. Protect trees, vegetation, and other designated features by erecting high-visibility, reusable construction fencing. Locate fence no closer to trees than the drip line. Plan equipment and vehicle access to minimize and confine soil disturbance and compaction to areas indicated on Drawings.

3.2.2 Layout

Stake out approved plant material locations and planter bed outlines on the project site before digging plant pits or beds. The Contracting Officer reserves the right to adjust plant material locations to meet field conditions. Do not plant trees or ground covers closer than 4' or shrubs closer than 33' to any building structure; verify with G for force protection requirements.

3.2.3 Erosion Control

Provide erosion control and seeding with native plant species to protect slopes.

3.2.4 Soil Preparation

3.2.4.1 Soil Conditioner Application Rates

Apply soil conditioners at rates as determined by laboratory soil analysis of the soils at the job site. For bidding purposes only apply at rates for

the following:

Compost Derivatives 8 cubic yards per 1000 square feet

3.2.5 Subsoil Drainage for Plant Pits and Beds

Provide as indicated. Lay perforated drain pipe with perforations down. Backfill trenches as specified in Section 31 00 00 EARTHWORK.

3.3 PLANT BED PREPARATION

Verify location of underground utilities prior to excavation. Do not disturb topsoil and vegetation in areas outside those indicated on Drawings. Where planting beds occur in existing turf areas, remove turf to a depth that will ensure removal of entire root system. Measure depth of plant pits from finished grade. Depth of plant pit excavation shall be as indicated and provide proper relation between top of root ball and finished grade. Install plant material as specified in paragraph entitled "Plant Installation." Do not install trees within 10 feet of any utility lines or building walls.

3.4 PLANT INSTALLATION

3.4.1 Individual Plant Pit Excavation

Excavate pits at least twice as large in diameter as the size of ball or container to depth shown.

3.4.2 Plant Beds with Multiple Plants

Excavate plant beds continuously throughout entire bed as outlined to depth shown.

3.4.3 Handling and Setting

Move plant materials only by supporting the root ball or container. Set plants on hand compacted layer of prepared backfill soil mixture 4 inches thick and hold plumb in the center of the pit until soil has been tamped firmly around root ball. Set plant materials, in relation to surrounding finish grade, one to 2 inches above depth at which they were grown in the nursery, collecting field or container. Replace plant material whose root balls are cracked or damaged either before or during the planting process.

Plant material shall be set in plant beds according to the drawings. Backfill soil mixture shall be placed on previously scarified subsoil to completely surround the root balls, and shall be brought to a smooth and even surface, blending to existing areas.

3.4.3.1 Balled and Burlapped Stock

Backfill with prepared soil mixture to approximately half the depth of ball and then tamp and water. Carefully remove or fold back excess burlap and tying materials from the top a minimum 1/3 depth from the top of the rootball. Tamp and complete backfill, place mulch topdressing, and water. Remove wires and non-biodegradable materials from plant pit prior to backfill operations.

3.4.3.2 Bare-Root Stock

Plant so roots are arranged in a natural position. Place roots in water a minimum of 30 minutes prior to planting. Carefully work prepared soil mixture among roots. Tamp remainder of backfill, place mulch topdressing and water.

3.4.3.3 Container Grown Stock

Remove from container and prevent damage to plant or root system.

3.4.3.4 Ground Covers and Vines

Plant after placing weed control fabric. Do not remove plant materials from flats or containers until immediately before planting. Space at intervals indicated. Plant at a depth to sufficiently cover all roots. Start watering areas planted as required by temperature and wind conditions. Apply water at a rate sufficient to ensure thorough wetting of soil to a depth of 6 inches without run off or puddling. Smooth planting areas after planting to provide even, smooth finish. Mulch as indicated.

3.4.4 Weed Control Fabric Installation

Remove grass and weed vegetation, including roots, from within the area enclosed by edging. Completely cover areas enclosed by edging with specified weed control fabric prior to placing mulch layer. Overlap cut edges 6 inches.

3.4.5 Erosion Control Material

Install in accordance with manufacturer's instructions.

3.4.6 Placement of Mulch Topdressing

Place specified mulch topdressing on top of weed control fabric covering total area enclosed by edging. Place mulch topdressing to a depth specified on planting detail.

3.4.7 Mulch Topdressing

Provide mulch topdressing over entire planter bed surfaces and individual plant surfaces including earth mound watering basin around plants to a depth specified on the planting details after completion of plant installation and before watering. Keep mulch out of the crowns of shrubs. Place mulch a minimum 2 to 3 inches away from trunk of shrub or tree. Place on top of any weed control fabric.

3.4.8 Installation of Edging

Uniformly edge beds of plants to provide a clear cut division line between planted area and adjacent lawn. Construct bed shapes as indicated. Install plastic edging material as indicated and as per manufacturer's instructions.

3.4.9 Fertilization

3.4.9.1 Fertilizer Tablets

Place fertilizer planting tablets evenly spaced around the plant pits to

the manufacturer's recommended depth.

3.4.9.2 Granular Fertilizer

Apply granular fertilizer as a top coat prior to placing mulch layer and water thoroughly.

3.4.10 Watering

Start watering areas planted as required by temperature and wind conditions. Slow deep watering shall be used. Apply water at a rate sufficient to ensure thorough wetting of soil to a depth of 6 inches without run off or puddling. Watering of other plant material or adjacent areas shall be prevented.

3.4.11 Staking and Guying

3.4.11.1 Staking

Stake plants with the number of stakes indicated complete with double strand of 12 gage guy wire as detailed. Attach guy wire half the tree height but not more than 5 feet high. Drive stakes to a depth of 2 1/2 to 3 feet into the ground outside the plant pit. Do not injure the root ball. Use hose chaffer guards where guy wire comes in contact with tree trunk.

3.4.11.2 Guying

Guy plants as indicated. Attach guying cable around the tree trunk at an angle of 45 degrees at approximately 1/2 of the trunk height. Protect tree trunks with chafing guards where guying wire contacts the tree trunk. Anchor guys to steel screw anchors. Fasten flags to each guying wire approximately 2/3 of the distance up from ground level. Provide turnbuckles as indicated.

3.4.11.3 Chafing Guards

Use hose chafing guards, as specified where guy wire will contact the plant.

3.4.11.4 Deadmen

Place deadmen minimum 18 inches below ground surface. Place equal distance from tree trunk and around the plant pit.

3.4.11.5 Steel Screw Anchors

Insert steel screw anchors as recommended in manufacturer's data. Place equal distance from tree trunk and around the plant pit.

3.4.11.6 Flags

Securely fasten flags on each guy wire approximately two-thirds of the distance up from ground level.

3.4.12 Pruning

Prune in accordance with safety requirement of TCIA Z133.1.

3.4.12.1 Trees and Shrubs

Remove dead and broken branches. Prune to correct structural defects only. Retain typical growth shape of individual plants with as much height and spread as practical. Do not cut central leader on trees. Make cuts with sharp instruments. Do not flush cut with trunk or adjacent branches. Collars shall remain in place. Pruning shall be accomplished by trained and experienced personnel and shall be accordance with ANSI A300.

3.4.12.2 Wound Dressing

Do not apply tree wound dressing to cuts.

3.5 RESTORATION AND CLEAN UP

3.5.1 Restoration

Turf areas, pavements and facilities that have been damaged from the planting operation shall be restored to original condition at the Contractor's expense.

3.5.2 Clean Up

Excess and waste material shall be removed from the installed area and shall be disposed offsite at an approved landfill, recycling center, or composting center. Separate and recycle or reuse the following landscape waste materials: nylon straps, wire, ball wrap, burlap, wood stakes,. Adjacent paved areas shall be cleared.

-- End of Section --

SECTION 33 11 00

WATER DISTRIBUTION

11/09

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO HB-17 (2002; Errata 2003; Errata 2005) Standard
Specifications for Highway Bridges

AMERICAN PETROLEUM INSTITUTE (API)

API Spec 5L (2007; Errata 2009) Specification for Line
Pipe

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA B300 (2004) Hypochlorites

AWWA B301 (2004) Liquid Chlorine

AWWA C104/A21.4 (2008) Cement-Mortar Lining for
Ductile-Iron Pipe and Fittings for Water

AWWA C110/A21.10 (2008) Ductile-Iron and Gray-Iron Fittings
for Water

AWWA C111/A21.11 (2000) Rubber-Gasket Joints for
Ductile-Iron Pressure Pipe and Fittings

AWWA C153/A21.53 (2006) Ductile-Iron Compact Fittings for
Water Service

AWWA C500 (2009) Metal-Seated Gate Valves for Water
Supply Service

AWWA C502 (2005) Dry-Barrel Fire Hydrants

AWWA C509 (2001) Resilient-Seated Gate Valves for
Water Supply Service

AWWA C550 (2005; Errata 2005) Protective Epoxy
Interior Coatings for Valves and Hydrants

AWWA C600 (2005) Installation of Ductile-Iron Water
Mains and Their Appurtenances

AWWA C605 (2005) Underground Installation of
Polyvinyl Chloride (PVC) Pressure Pipe and

Fittings for Water

AWWA C651	(2005; Errata 2005) Standard for Disinfecting Water Mains
AWWA C700	(2002; Errata 2008) Standard for Cold Water Meters - Displacement Type, Bronze Main Case
AWWA C900	(2007; Errata 2008) Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Distribution
AWWA M23	(2002) Manual: PVC Pipe - Design and Installation

ASME INTERNATIONAL (ASME)

ASME B16.15	(2006) Cast Bronze Alloy Threaded Fittings Classes 125 and 250
ASME B16.18	(2001; R 2005) Cast Copper Alloy Solder Joint Pressure Fittings
ASME B16.22	(2001; R 2005) Standard for Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
ASME B16.26	(2006) Standard for Cast Copper Alloy Fittings for Flared Copper Tubes
ASME B18.2.2	(1987; R 2005) Standard for Square and Hex Nuts
ASME B18.5.2.1M	(2006) Metric Round Head Short Square Neck Bolts
ASME B18.5.2.2M	(1982; R 2005) Metric Round Head Square Neck Bolts

ASTM INTERNATIONAL (ASTM)

ASTM A 105/A 105M	(2009) Standard Specification for Carbon Steel Forgings for Piping Applications
ASTM A 307	(2007b) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 336/A 336M	(2009) Standard Specification for Alloy Steel Forgings for Pressure and High-Temperature Parts
ASTM A 47/A 47M	(1999; R 2009) Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
ASTM A 48/A 48M	(2003; R 2008) Standard Specification for

Gray Iron Castings

ASTM A 536	(1984; R 2009) Standard Specification for Ductile Iron Castings
ASTM A 563	(2007a) Standard Specification for Carbon and Alloy Steel Nuts
ASTM B 42	(2002e1) Standard Specification for Seamless Copper Pipe, Standard Sizes
ASTM B 88	(2009) Standard Specification for Seamless Copper Water Tube
ASTM C 94/C 94M	(2009) Standard Specification for Ready-Mixed Concrete
ASTM D 1785	(2006) Standard Specification for Poly(Vinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2241	(2009) Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 2774	(2008) Underground Installation of Thermoplastic Pressure Piping
ASTM D 2855	(1996; R 2002) Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D 3034	(2008) Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3139	(1998; R 2005) Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM F 402	(2005) Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
ASTM F 477	(2008) Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-80	(2008) Bronze Gate, Globe, Angle and Check Valves
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NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 24	(2010) Standard for the Installation of Private Fire Service Mains and Their Appurtenances
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NFPA 325 (1994) Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids

NFPA 49 (2003) Hazardous Chemicals Data

NFPA 704 (2006) Identification of the Hazards of Materials for Emergency Response

TEXAS ADMINISTRATIVE CODE (TAC)

30 TAC 290 (2009) Public Drinking Water

30 TAC 217 (2007) Design Criteria for Domestic Wastewater Systems

UNDERWRITERS LABORATORIES (UL)

UL 262 (2004) Standard for Gate Valves for Fire-Protection Service

UL 789 (2004; Rev thru Aug 2008) Indicator Posts for Fire-Protection Service

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-3 (1992) Recommended Practice for the Installation of Polyvinyl Chloride (PVC) Pressure Pipe (Nominal Diameters 4-36 Inch)

1.2 DESIGN REQUIREMENTS

1.2.1 Water Distribution Mains

Provide water distribution mains indicated as 6 through 12 inch diameter pipe sizes of polyvinyl chloride (PVC) plastic pipe. Also provide water main accessories including, but not limited to gate valves and fittings. as specified and where indicated.

1.2.2 Water Service Lines

Provide water service lines indicated and sized by the plans from water distribution main to building service at the connection points indicated. Water service lines shall be polyvinyl chloride (PVC) plastic . Polyvinyl chloride (PVC) plastic pipe appurtenances, and valves as specified for water mains may also be used for service lines. Provide water service line appurtenances as specified and where indicated. Water service lines 4 inches and smaller shall be copper pipe.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Piping Materials

Water distribution main or fire line distribution main piping, fittings, joints, valves, and coupling

Water service or fire line piping, fittings, joints, valves, and coupling

Hydrants

Indicator posts

Corporation stops

Valve boxes

Submit manufacturer's standard drawings or catalog cuts, except submit both drawings and cuts for push-on and rubber-gasketed bell-and-spigot joints. Include information concerning gaskets with submittal for joints and couplings.

SD-06 Test Reports

Bacteriological Disinfection;

Test results from commercial laboratory verifying disinfection

SD-07 Certificates

Water distribution main piping, fittings, joints, valves, and coupling

Water service line piping, fittings, joints, valves, and coupling

Lining

Fire hydrants

Certificates shall attest that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or otherwise and that production control tests have been performed at the intervals or frequency specified in the publication. Other tests shall have been performed within 3 years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

SD-08 Manufacturer's Instructions

Delivery, storage, and handling

Installation procedures for water piping

SD-11 Closeout Submittals

Recycled Material Content; (LEED)

LEED documentation relative to recycled content credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery and Storage

Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, valves and hydrants free of dirt and debris.

1.4.2 Handling

Handle pipe, fittings, valves, hydrants, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make repairs if coatings or linings are damaged. Do not place any other material or pipe inside a pipe or fitting after the coating has been applied. Carry, do not drag pipe to the trench. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method. Before installation, the pipe shall be inspected for defects. Material found to be defective before or after laying shall be replaced with sound material without additional expense to the Government. Store rubber gaskets that are not to be installed immediately, under cover out of direct sunlight.

1.4.2.1 Miscellaneous Plastic Pipe and Fittings

Handle Polyvinyl Chloride (PVC), pipe and fittings in accordance with the manufacturer's recommendations. Store plastic piping and jointing materials that are not to be installed immediately under cover out of direct sunlight.

Storage facilities shall be classified and marked in accordance with NFPA 704, with classification as indicated in NFPA 49 and NFPA 325.

1.5 SUSTAINABLE DESIGN REQUIREMENTS

1.5.1 Recycled Material Content

Use materials or products so that the sum of post-consumer recycled content value plus one-half of post-industrial recycled content value constitutes at least 10 percent of the total materials cost for the project.

PART 2 PRODUCTS

2.1 WATER DISTRIBUTION MAIN OR FIRE LINE DISTRIBUTION MAIN MATERIALS

2.1.1 Piping Materials

2.1.1.1 Polyvinyl Chloride (PVC) Plastic Piping

- a. Pipe and Fittings: Pipe, AWWA C900, shall be plain end or gasket bell end, Pressure Class 150 (DR 18) with cast-iron-pipe-equivalent OD.
- b. Fittings for PVC pipe: Fittings shall be gray iron or ductile iron, AWWA C110/A21.10 or AWWA C153/A21.53, and have cement-mortar lining, AWWA C104/A21.4, standard thickness. Fittings with push-on joint ends shall conform to the same requirements as fittings with mechanical-joint ends, except that bell design shall be modified, as approved, for push-on joint suitable for use with PVC plastic pipe specified in this paragraph. Iron fittings and specials shall be cement-mortar lined in accordance with AWWA C104/A21.4. Fittings and specials may be of the same material as the pipe with elastomeric gaskets, all in conformance with AWWA C605 and AWWA C900.
- c. Joints and Jointing Material: Joints for pipe shall be push-on joints, ASTM D 3139. Joints between pipe and metal fittings, valves, and other accessories shall be push-on joints ASTM D 3139, or compression-type joints/mechanical joints, ASTM D 3139 and AWWA C111/A21.11. Provide each joint connection with an elastomeric gasket suitable for the bell or coupling with which it is to be used. Gaskets for push-on joints for pipe, ASTM F 477. Gaskets for push-on joints and compression-type joints/mechanical joints for joint connections between pipe and metal fittings, valves, and other accessories, AWWA C111/A21.11, respectively, for push-on joints and mechanical joints. Mechanically coupled joints using a sleeve-type mechanical coupling, as specified in paragraph entitled "Sleeve-Type Mechanical Couplings," may be used as an optional jointing method in lieu of push-on joints on plain-end PVC plastic pipe, subject to the limitations specified for mechanically coupled joints using a sleeve-type mechanical coupling and to the use of internal stiffeners as specified for compression-type joints in ASTM D 3139.

2.1.2 Casing Pipe

Casing and/or encasement pipe on water lines where indicated shall be ASTM A 336/A 336M Grade B, ASTM A 105/A 105M, Grade B or API Spec 5L, Grade B pipe. Wall thickness shall be Schedule 40, up to a maximum thickness of 0.5 inches.

Casing and/or encasement pipe on water lines crossing underneath sanitary sewers, in lieu of the above steel encasement may be PVC pipe conforming to ASTM D 2241 or ASTM D 3034. PVC encasement pipes shall have a minimum pipe stiffness of 115 PSI at 5.0% deflection. PVC encasement pipe must be blue in color.

2.1.1.3 Valves, Hydrants, and Other Water Main Accessories

2.1.1.3.1 Gate Valves on Buried Piping

AWWA C500, AWWA C509, or UL 262. Unless otherwise specified, valves conforming to: (1) AWWA C500 shall be nonrising stem type with double-disc gates and mechanical-joint ends or push-on joint ends as appropriate for the adjoining pipe, (2) AWWA C509 shall be nonrising stem type with mechanical-joint ends or resilient-seated gate valves 3 to 12 inches in size, and (3) UL 262 shall be inside-screw type with operating nut, double-disc or split-wedge type gate, designed for a hydraulic working pressure of 150 psi, and shall have mechanical-joint ends or push-on joint ends as appropriate for the pipe to which it is joined. Materials for UL 262 valves shall conform to the reference standards specified in AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have O-ring stem seals, except for those valves for which gearing is specified, in which case use conventional packing in place of O-ring seal. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair. In lieu of mechanical-joint ends and push-on joint ends, valves may have special ends for connection to cement piping or to sleeve-type mechanical coupling. Valve ends and gaskets for connection to cement piping or to sleeve-type mechanical coupling shall conform to the applicable requirements specified for the joint or coupling. Where a post indicator is shown, the valve shall have an indicator post flange; indicator post flange for AWWA C500 valve shall conform to the applicable requirements of UL 262. Valves shall be of one manufacturer and shall have interior and exterior epoxy coatings conforming to AWWA C550.

2.1.1.3.2 Gate Valves in Valve Pit(s) and Aboveground Location

AWWA C500, AWWA C509, or UL 262. Unless otherwise specified, valves conforming to: (1) AWWA C500 shall be outside-screw-and-yoke rising-stem type with solid-wedge gates and flanged ends, (2) AWWA C509 shall be outside-screw-and-yoke rising-stem type with flanged ends, and (3) UL 262 shall be outside-screw-and-yoke type, shall have solid or one-piece type gate and flanged ends, and shall be designed for a hydraulic working pressure of 150 psi. Materials for UL 262 valves shall conform to the reference standards specified in AWWA C500. Provide valves with handwheels that open by counterclockwise rotation of the valve stem. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair. Valves shall be of one manufacturer.

2.1.1.3.3 Vacuum and Air Relief Valves

Vacuum and air relief valves shall be of the size shown and shall be of a type that will release air and prevent the formation of a vacuum. The valves shall automatically release air when the lines are being filled with water and shall admit air into the line when water is being withdrawn in excess of the inflow. Valves shall be iron body with bronze trim and stainless steel float.

2.1.1.3.4 Fire Hydrants

Shall be Mueller Super Centurion A423, 4-1/2" pumper nozzle, 5 1/4" main valve, with Aquagrip system. Nozzle threads shall be ordered to match Fort Bliss Fire Department standard thread requirements.

Each fire hydrant installed must include an antiterrorism check valve.

Approved devices include the Davidson Hydrant Security Device (ATV) or approved equal. The device shall be a stealth check-valve located in the barrel of the traffic portion of each hydrant. The ATV shall consist of four main parts; insert seat, valve, stainless steel machined stem and a stainless-steel spring. When installed the ATV shall be effective in preventing contamination of the water system either from back-flowing under pressure or contamination by siphoning into the water main. The device shall be equally effective at preventing hydrant vandalism, i.e., placement of foreign objects such as rocks, bottles, silt or tennis balls into the hydrant which could clog fire engine pumper screens or damage the impeller blades. The ATV, when installed, must be stealth and passive requiring no action on the part of the fire department other than that normally required to activate the hydrant. The ATV, when installed, shall be maintenance-free and expose potable water to no new materials other than those currently approved for use in fire hydrants. The device shall meet a back pressure of 350psi without allowing an agent to enter the system.

- a. Insert Seat: The insert seat shall be a EPDM/powder-coated steel sleeve inserted into the top of the hydrant barrel at the traffic breakaway allowing the seat for the valve to be positioned not less than one-eighth inch (1/8") nor more than one-inch (1") below the lowest nozzle outlet of the hydrant. The insert seat shall be machined to provide a venturi shape so as to minimize loss of water flow through the hydrant. The top of the insert seat shall have a machined seat to accommodate an EPDM Chloramine resistant quad-ring gasket which will provide an impenetrable seal between the insert seat and the valve. Insert seat diameter shall be sized to fit each individual model of hydrant. The insert shall include a breathing mechanism which allows the hydrant to weep but does not allow an agent into the hydrant. The insert shall be equipped with a normally open check-valve. Check-valve shall be made of bronze and consist of a piston which seats in a bronze housing. Check-valve shall be pre-loaded in the open position by a stainless-steel spring which closes at pressures greater than 1psi allowing air into the barrel of the hydrant, but preventing the passage of solids or liquids into the barrel.
- b. Valve: The valve shall be forged of bronze and machined to fit the barrel size of each individual hydrant model. The valve shall be a hat-shaped device with flange which seals on the EPDM quad-ring gasket of the insert seat. The valve shall be attached to the stainless steel stem in such a manner as to provide free vertical movement along the stem. The seal between the valve and the stem shall be provided by an EPDM or Viton O-ring. The top of the valve shall provide a recess to accept the stainless-steel spring. This recess shall be deep enough to allow the valve, when in the up position, to travel high enough that it does not obstruct the flow of water through the hydrant.
- c. Stainless-Steel Stem: The stem shall be made of machined 304 stainless steel, and shall be a diameter and length which is compatible with the stem it replaces. The stem shall have left or right-hand threads as required by the hydrant bonnet into which it is installed. Accommodations for traffic connections shall be provided at the bottom of the stem which are compatible with those in the new hydrant.
- d. Stainless-Steel Spring: The spring shall be made of 304 stainless-steel, fit around the stem and free float on the valve

on one extremity and attach to the hydrant bonnet on the other so that adequate pressure is placed on the valve to provide an impenetrable seal when the hydrant is not in use. The spring shall allow for water flow to open the valve and shall close the valve prior to the occurrence of any negative pressure.

2.1.3.5 Indicator Posts

UL 789. Provide for gate valves where indicated.

2.1.3.6 Valve Boxes

Provide a valve box for each gate valve on buried piping, except where indicator post is shown. Valve boxes shall be of slip type cast iron valve box of a size suitable for the valve on which it is to be used and shall be adjustable. Valve boxes installed in locations subjected to vehicular traffic shall be designed to withstand H20 AASHTO load designation as outline in AASHTO HB-17. Provide a round head. Cast the word "WATER" on the lid. The least diameter of the shaft of the box shall be 5 1/4 inches.

2.1.3.7 Valve Pits

Valve pits shall be constructed at locations indicated or as required above and in accordance with the details shown.

2.1.3.8 Sleeve-Type Mechanical Couplings

Couplings shall be designed to couple plain-end piping by compression of a ring gasket at each end of the adjoining pipe sections. The coupling shall consist of one middle ring flared or beveled at each end to provide a gasket seat; two follower rings; two resilient tapered rubber gaskets; and bolts and nuts to draw the follower rings toward each other to compress the gaskets. The middle ring and the follower rings shall be true circular sections free from irregularities, flat spots, and surface defects; the design shall provide for confinement and compression of the gaskets. For ductile iron and PVC plastic pipe, the middle ring shall be of cast-iron or steel; and the follower rings shall be of malleable or ductile iron. Cast iron, ASTM A 48/A 48M not less than Class 25. Malleable and ductile iron shall, conform to ASTM A 47/A 47M and ASTM A 536, respectively. Gaskets shall be designed for resistance to set after installation and shall meet the applicable requirements specified for gaskets for mechanical joint in AWWA C111/A21.11. Bolts shall be track-head type, ASTM A 307, Grade A, with nuts, ASTM A 563, Grade A; or round-head square-neck type bolts, ASME B18.5.2.1M and ASME B18.5.2.2M with hex nuts, ASME B18.2.2. Bolts shall be 5/8 inch in diameter; minimum number of bolts for each coupling shall be per manufacturer. Bolt holes in follower rings shall be of a shape to hold fast the necks of the bolts used. Mechanically coupled joints using a sleeve-type mechanical coupling shall not be used as an optional method of jointing except where pipeline is adequately anchored to resist tension pull across the joint. Mechanical couplings shall provide a tight flexible joint under all reasonable conditions, such as pipe movements caused by expansion, contraction, slight setting or shifting in the ground, minor variations in trench gradients, and traffic vibrations. Couplings shall be of strength not less than the adjoining pipeline.

2.1.3.9 Bonded Joints

Where indicated, a metallic bond shall be provided at each joint, including joints made with flexible couplings, caulking, or rubber gaskets,

of ferrous metallic piping to effect continuous conductivity. The bond wire shall be Size 1/0 copper conductor suitable for direct burial shaped to stand clear of the joint. The bond shall be of the thermal weld type.

2.1.3.10 Tracer Wire for Nonmetallic Piping

Provide bare copper or aluminum wire not less than 0.10 inch in diameter in sufficient length to be continuous over each separate run of nonmetallic pipe.

2.2 WATER SERVICE OR FIRE LINE MATERIALS

2.2.1 Piping Materials

2.2.1.1 Copper Pipe and Associated Fittings

Pipe, ASTM B 42, regular, threaded ends. Fittings shall be brass or bronze, ASME B16.15, 125 pound.

2.2.1.2 Copper Tubing and Associated Fittings

Tubing, ASTM B 88, Type K. Fittings for solder-type joint, ASME B16.18 or ASME B16.22; fittings for compression-type joint, ASME B16.26, flared tube type.

2.2.1.3 Plastic Piping

Plastic pipe and fittings shall bear the seal of the National Sanitation Foundation (NSF) for potable water service. Plastic pipe and fittings shall be supplied from the same manufacturer.

a. Polyvinyl Chloride (PVC) Plastic Piping with Elastomeric-Gasket Joints:

Pipe shall conform to dimensional requirements of ASTM D 1785 Schedule 40, with joints meeting the requirements of 150 psi working pressure, 200 psi hydrostatic test pressure, unless otherwise shown or specified.

2.2.1.4 Insulating Joints

Joints between pipe of dissimilar metals shall have a rubber-gasketed or other suitable approved type of insulating joint or dielectric coupling which will effectively prevent metal-to-metal contact between adjacent sections of piping.

2.2.2 Water Service Line Appurtenances

2.2.2.1 Gate Valves 3 Inch Size and Larger on Buried Piping

Gate valves 3 inch size and larger on buried piping AWWA C500 or UL 262 and of one manufacturer. Valves, AWWA C500, nonrising stem type with double-disc gates. Valves, UL 262, inside-screw type with operating nut, split wedge or double disc type gate, and designed for a hydraulic working pressure of 175 psi. Materials for UL 262 valves conforming to the reference standards specified in AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have O-ring stem seals and shall be bolted and constructed so as to permit easy removal of parts for repair.

2.2.2.2 Gate Valve 3 Inch Size and Larger

Gate valves 3 inch size and larger in valve pits and aboveground locations, AWWA C500 or UL 262 and of one make. Valves conforming to: (1) AWWA C500 shall be outside-screw-and-yoke rising-stem type with flanged ends and solid-wedge gates. Provide valves with handwheels that open by a counterclockwise rotation of the valve stem. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair.

2.2.2.3 Gate Valves Smaller Than 3 Inch Size in Valve Pits

MSS SP-80, Class 150, solid wedge, inside screw, rising stem. Valves shall have flanged or threaded end connections, with a union on one side of the valve and a handwheel operator.

2.2.2.4 Curb Boxes

Provide a curb box for each curb or service stop. Curb boxes shall be of cast iron of a size suitable for the stop on which it is to be used. Provide a round head. Cast the word "WATER" on the lid. Each box shall have a heavy coat of bituminous paint.

2.2.2.5 Valve Boxes

Provide a valve box for each gate valve on buried piping. Valve boxes shall be of slip joint cast iron as indicated of a size suitable for the valve on which it is to be used and shall be adjustable. Valve boxes installed in locations subjected to vehicular traffic shall be designed to withstand the following H20 AASHTO load designation as outline in AASHTO HB-17. Provide a round head. Cast the word "WATER" on the lid. The least diameter of the shaft of the box shall be 5 1/4 inches.

2.2.2.6 Tapping Sleeves

Tapping sleeves of the sizes indicated for connection to existing main shall be the cast gray, ductile, or malleable iron, split-sleeve type with flanged or grooved outlet, and with bolts, follower rings and gaskets on each end of the sleeve. Construction shall be suitable for a maximum working pressure of 150 psi. Bolts shall have square heads and hexagonal nuts. Longitudinal gaskets and mechanical joints with gaskets shall be as recommended by the manufacturer of the sleeve. When using grooved mechanical tee, it shall consist of an upper housing with full locating collar for rigid positioning which engages a machine-cut hole in pipe, encasing an elastomeric gasket which conforms to the pipe outside diameter around the hole and a lower housing with positioning lugs, secured together during assembly by nuts and bolts as specified, pretorqued to 50 foot-pound.

2.2.2.7 Displacement Type Meters

Displacement type meters shall conform to AWWA C700. Registers shall be straight-reading and shall read in cubic meters U.S. gallon. Connections shall be suitable to the type of pipe and conditions encountered. Meters shall comply with the accuracy and capacity requirements of AWWA C700.

2.2.2.8 Meter Boxes

Meter boxes shall be of cast iron, concrete, or plastic. Concrete meter

boxes shall be manufactured in accordance with Section 03 40 00.00 10 PLANT-PRECAST CONCRETE PRODUCTS FOR BELOW GRADE CONSTRUCTION. The boxes shall be of sufficient size to completely enclose the meter and shutoff valve or service stop. Meter boxes shall be cast iron, or concrete with cast iron lid and cast iron meter reader lid. Box height shall extend from invert of the meter to final grade at the meter location. The lid shall have the word "WATER" cast in it.

2.2.2.9 Disinfection

Chlorinating materials shall conform to the following:

Chlorine, Liquid: AWWA B301.

Hypochlorite, Calcium and Sodium: AWWA B300.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES

3.1.1 General Requirements for Installation of Pipelines

These requirements shall apply to all pipeline installation except where specific exception is made in the "Special Requirements..." paragraphs.

3.1.1.1 Location of Water Lines

Terminate the work covered by this section at a point approximately 5 feet from the building, unless otherwise indicated. Where the location of the water line is not clearly defined by dimensions on the drawings, do not lay water line closer horizontally than 10 feet from any sewer line. Where water lines cross over or under gravity sewer lines, construct crossing as indicated in drawings and in accordance with TCEQ Requirements 30 TAC 290 and 30 TAC 217. Do not lay water lines in the same trench with gas lines or electric wiring. Copper tubing shall not be installed in the same trench with ferrous piping materials. Where nonferrous metallic pipe, e.g. copper tubing, cross any ferrous piping, provide a minimum vertical separation of 12 inches between pipes.

Where water piping is required to be installed within 3 feet of existing structures, the water pipe shall be sleeved as required in Paragraph "Casting Pipe". The Contractor shall install the water pipe and sleeve ensuring that there will be no damage to the structures and no settlement or movement of foundations or footings.

3.1.1.2 Earthwork

Perform earthwork operations in accordance with Section 31 00 00 Earthwork.

3.1.1.3 Pipe Laying and Jointing

Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories, and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or any other water line material into trenches. Cut pipe in a neat workmanlike manner accurately to length established at the site and work

into place without springing or forcing. Replace by one of the proper length any pipe or fitting that does not allow sufficient space for proper installation of jointing material. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying. Grade the pipeline in straight lines; avoid the formation of dips and low points. Support pipe at proper elevation and grade. Secure firm, uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports where indicated and where necessary for fastening work into place. Make proper provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been properly made. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions of trench or weather prevent installation. Depth of cover over top of pipe shall not be less than indicated in drawings.

3.1.1.4 Installation of Tracer Wire

Install a continuous length of tracer wire for the full length of each run of nonmetallic pipe. Attach wire to top of pipe in such manner that it will not be displaced during construction operations.

3.1.1.5 Connections to Existing Water Lines

Coordinate connections to existing water lines after approval is obtained and with a minimum interruption of service on the existing line. Make connections to existing lines under pressure in accordance with the recommended procedures of the manufacturer of the pipe being tapped, or as directed by the Contracting Officer..

3.1.1.6 Penetrations

Pipe passing through walls of valve pits and structures shall be provided with ductile-iron or Schedule 40 steel wall sleeves. Annular space between walls and sleeves shall be filled with rich cement mortar. Annular space between pipe and sleeves shall be filled with mastic.

3.1.1.7 Flanged Pipe

Flanged pipe shall only be installed above ground or with the flanges in valve pits.

3.1.2 Special Requirements for Installation of Water Mains

3.1.2.1 Installation of PVC Plastic Water Main Pipe

Installation of PVC Plastic Water Main Pipe and Associated Fittings: Unless otherwise specified, install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines"; with the requirements of UBPPA UNI-B-3 for laying of pipe, joining PVC pipe to fittings and accessories, and setting of hydrants, valves, and fittings; and with the recommendations for pipe joint assembly and appurtenance installation in AWWA M23, Chapter 7, "Installation."

- a. Jointing: Make push-on joints with the elastomeric gaskets

specified for this type joint, using either elastomeric-gasket bell-end pipe or elastomeric-gasket couplings. For pipe-to-pipe push-on joint connections, use only pipe with push-on joint ends having factory-made bevel; for push-on joint connections to metal fittings, valves, and other accessories, cut spigot end of pipe off square and re-bevel pipe end to a bevel approximately the same as that on ductile-iron pipe used for the same type of joint. Use an approved lubricant recommended by the pipe manufacturer for push-on joints. Assemble push-on joints for pipe-to-pipe joint connections in accordance with the requirements of UBPPA UNI-B-3 for laying the pipe and the recommendations in AWWA M23, Chapter 7, "Installation," for pipe joint assembly. Assemble push-on joints for connection to fittings, valves, and other accessories in accordance with the requirements of UBPPA UNI-B-3 for joining PVC pipe to fittings and accessories and with the applicable requirements of AWWA C600 for joint assembly. Make compression-type joints/mechanical joints with the gaskets, glands, bolts, nuts, and internal stiffeners previously specified for this type joint; assemble in accordance with the requirements of UBPPA UNI-B-3 for joining PVC pipe to fittings and accessories, with the applicable requirements of AWWA C600 for joint assembly, and with the recommendations of Appendix A to AWWA C111/A21.11. Cut off spigot end of pipe for compression-type joint/mechanical-joint connections and do not re-bevel. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer using internal stiffeners as previously specified for compression-type joints.

- b. Offset: Maximum offset in alignment between adjacent pipe joints shall be as recommended by the manufacturer and approved by the Contracting Officer, but shall not exceed 5 degrees.
- c. Pipe Anchorage: Provide concrete thrust blocks (reaction backing) for pipe anchorage. Thrust blocks shall be in accordance with the requirements of UBPPA UNI-B-3 for reaction or thrust blocking and plugging of dead ends, except that size and positioning of thrust blocks shall be as indicated. Use concrete, ASTM C 94/C 94M, having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength.
- d. Fittings: Install in accordance with AWWA C605.

3.1.2.2 Installation of Valves and Hydrants

- a. Install gate valves on PVC water mains in accordance with the recommendations for appurtenance installation in AWWA M23, Chapter 7, "Installation." Make and assemble joints to gate valves and check valves as specified for making and assembling the same type joints between pipe and fittings.
- b. Installation of Hydrants: Install hydrants in accordance with AWWA C600 for hydrant installation and as indicated. Make and assemble joints as specified for making and assembling the same type joints between pipe and fittings. Install hydrants with the large nozzle facing the adjacent paved surface where a fire truck would drive and park. If there are two paved adjacent surfaces,

contact the Contracting Officer for further instructions.

- c. Installation of Antiterrorism Check Valve. Install according to manufacturers requirements.

3.1.1.3 Installation of Water Service Piping

3.1.1.3.1 Location

Where building service has not been installed, terminate water service lines approximately 5 feet from the building line at the points indicated and cap such water service lines as indicated.

3.1.1.4 Special Requirements for Installation of Water Service Piping

3.1.1.4.1 Installation of Plastic Piping

Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" and with the applicable requirements of ASTM D 2774 and ASTM D 2855, unless otherwise specified. Handle solvent cements used to join plastic piping in accordance with ASTM F 402.

- a. Jointing: Make solvent-cemented joints for PVC plastic piping using the solvent cement previously specified for this material; assemble joints in accordance with ASTM D 2855. Make plastic pipe joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.
- b. Plastic Pipe Connections to Appurtenances: Connect plastic pipe service lines to corporation stops and gate valves in accordance with the recommendations of the plastic pipe manufacturer.

3.1.1.4.2 Service Lines for Sprinkler Supplies

Water service lines used to supply building sprinkler systems for fire protection shall be connected to the fire line main in accordance with NFPA 24.

3.1.1.4.3 Location of Meters

Vaults shall be installed at the locations shown on the drawings. The meters shall be centered in the vaults to allow for reading and ease of removal or maintenance.

3.1.1.5 Disinfection

Prior to disinfection, obtain Contracting Officer approval of the proposed method for disposal of waste water from disinfection procedures. Disinfect new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C651. Fill piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with domestic water until maximum residual chlorine content is within the range of 0.2 and 0.5 parts per million, or the residual chlorine content of domestic water supply. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit the results prior to the new water piping being placed into service. Disinfection of systems supplying nonpotable

water is not required.

3.2 FIELD QUALITY CONTROL

3.2.1 Field Tests and Inspections

Prior to hydrostatic testing, obtain Contracting Officer approval of the proposed method for disposal of waste water from hydrostatic testing. The Contracting Officer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing. The Contractor shall produce evidence, when required, that any item of work has been constructed in accordance with the drawings and specifications. Do not begin testing on any section of a pipeline where concrete thrust blocks have been provided until at least 5 days after placing of the concrete.

3.2.2 Testing Procedure

Test water mains and water service lines in accordance with the applicable specified standard, except for the special testing requirements given in paragraph entitled "Special Testing Requirements." Test PVC plastic water mains and water service lines made with PVC plastic water main pipe in accordance with the requirements of UBPPA UNI-B-3 for pressure and leakage tests. The amount of leakage on pipelines made of PVC plastic water main pipe shall not exceed the amounts given in UBPPA UNI-B-3, except that at joints made with sleeve-type mechanical couplings, no leakage will be allowed. Test water service lines in accordance with applicable requirements of AWWA C600 for hydrostatic testing. No leakage will be allowed at copper pipe joints, copper tubing joints (soldered, compression type, brazed), plastic pipe joints, flanged joints and screwed joints.

3.2.3 Testing of Antiterrorism Check Valve

Independent test results on each ATV must be submitted which certify the following:

- a. Compliance with AWWA C502 for hydrant flow and head loss.
- b. Operational reliability of the ATV.
- c. Proof of effectiveness of ATV at preventing contaminant introduction at back-pressures of up to a minimum of 350 psi.

3.2.4 Special Testing Requirements

For pressure test, use a hydrostatic pressure 50 psi greater than the maximum working pressure of the system, except that for those portions of the system having pipe size larger than 2 inches in diameter, hydrostatic test pressure shall be not less than 200 psi. Hold this pressure for not less than 2 hours. Prior to the pressure test, fill that portion of the pipeline being tested with water for a soaking period of not less than 24 hours. For leakage test, use a hydrostatic pressure not less than the maximum working pressure of the system. Leakage test may be performed at the same time and at the same test pressure as the pressure test.

3.2.5 Fire Line Testing Requirements

Test fire line mains and fire service lines in the same manner plastic water mains and service lines. Fire lines shall also be tested with

special testing requirements as water mains.

3.3 CLEANUP

Upon completion of the installation of water lines, and appurtenances, all debris and surplus materials resulting from the work shall be removed.

-- End of Section --

SECTION 33 30 00

SANITARY SEWERS

04/08

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 150	(2007) Standard Specification for Portland Cement
ASTM C 260	(2006) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C 270	(2008a) Standard Specification for Mortar for Unit Masonry
ASTM C 33	(2003) Standard Specification for Concrete Aggregates
ASTM C 443	(2005ae1) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C 478	(2009) Standard Specification for Precast Reinforced Concrete Manhole Sections
ASTM C 923	(2002) Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
ASTM C 94/C 94M	(2009) Standard Specification for Ready-Mixed Concrete
ASTM C 969	(2002) Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
ASTM C 972	(2000; R 2006) Compression-Recovery of Tape Sealant
ASTM C 990	(2006) Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants
ASTM D 2321	(2005) Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

ASTM D 2412	(2002) Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
ASTM D 2680	(2001) Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping
ASTM D 2751	(2005) Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
ASTM D 3034	(2008) Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3212	(2007) Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D 412	(2006ae1e2) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D 624	(2000e1) Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM F 477	(2008) Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F 794	(2003) Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
ASTM F 949	(2006a) Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-6	(1998) Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe
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1.2 SYSTEM DESCRIPTION

1.2.1 Sanitary Sewer Gravity Pipeline

Provide mains and laterals 8 and 12 inch lines of PVC plastic pipe. . Provide new exterior sanitary gravity sewer piping and appurtenances. Provide each system complete and ready for operation. The exterior sanitary gravity sewer system includes equipment, materials, installation, and workmanship as specified herein from 5 feet outside of building walls, to and including connection to the existing sanitary sewer system.

1.2.2 USACE Project

The construction required herein shall include appurtenant structures and piping from point of connection with the building stubouts (5 feet outside the building) to and including connection to the existing sanitary system. Replace damaged material and redo unacceptable work at no additional cost to the Government. Backfilling shall be accomplished after inspection by the Contracting Officer. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. Keep a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install the plastic pipe shall be stored in accordance with the manufacturer's recommendation and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Existing Conditions

Drawings of existing conditions, as specified.

SD-02 Shop Drawings

Drawings

Installation and As-Built drawings, as specified.

Precast concrete manhole

Metal items

Frames, covers, and gratings

Details, as specified.

SD-03 Product Data

Pipeline materials

Submit manufacturer's standard drawings or catalog cuts.

SD-06 Test Reports

Reports

Test and inspection reports, as specified.

SD-07 Certificates

Portland Cement

Certificates of compliance stating the type of cement used in manufacture of concrete pipe, fittings and precast manholes.

1.4 QUALITY ASSURANCE

1.4.1 Installer Qualifications

Install specified materials by a licensed underground utility Contractor licensed for such work in the state where the work is to be performed. Installing Contractor's License shall be current and be state certified or state registered.

1.4.2 Drawings

a. Submit Installation Drawings showing complete detail, both plan and side view details with proper layout and elevations.

b. Submit As-Built Drawings for the complete sanitary sewer system showing complete detail with all dimensions, both above and below grade, including invert elevation.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery and Storage

1.5.1.1 Piping

Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping and jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

1.5.1.2 Metal Items

Check upon arrival; identify and segregate as to types, functions, and sizes. Store off the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.

1.5.1.3 Cement, Aggregate, and Reinforcement

As specified in Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE.

1.5.2 Handling

Handle pipe, fittings, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. Take special care not to damage linings of pipe and fittings; if lining is damaged, make satisfactory repairs. Carry, do not drag, pipe to trench.

1.6 PROJECT/SITE CONDITIONS

Submit drawings of existing conditions, after a thorough inspection of the area in the presence of the Contracting Officer. Details shall include the environmental conditions of the site and adjacent areas. Submit copies of the records for verification before starting work.

PART 2 PRODUCTS

2.1 PIPELINE MATERIALS

Pipe shall conform to the respective specifications and other requirements specified below.

2.1.1 PVC Plastic Gravity Sewer Piping

2.1.1.1 PVC Plastic Gravity Pipe and Fittings

ASTM D 3034, SDR 35, or ASTM F 949 with ends suitable for elastomeric gasket joints. ASTM F 794, Series 46, for ribbed sewer pipe with smooth interior, size 8 inch through 48 inch diameters.

2.1.1.2 PVC Plastic Gravity Joints and Jointing Material

Joints shall conform to ASTM D 3212. Gaskets shall conform to ASTM F 477.

2.2 CONCRETE MATERIALS

2.2.1 Cement Mortar

Cement mortar shall conform to ASTM C 270, Type M with Type II cement.

2.2.2 Portland Cement

Portland cement shall conform to ASTM C 150, Type V for concrete used in concrete pipe, concrete pipe fittings, and manholes and type optional with the Contractor for cement used in concrete cradle, concrete encasement, and thrust blocking. Air-entraining admixture conforming to ASTM C 260 shall be used with Type V cement. Where aggregates are alkali reactive, as determined by Appendix XI of ASTM C 33, a cement containing less than 0.60 percent alkalies shall be used.

2.2.3 Portland Cement Concrete

Portland cement concrete shall conform to ASTM C 94/C 94M, compressive strength of 4000 psi at 28 days, except for concrete cradle and encasement or concrete blocks for manholes. Concrete used for cradle and encasement shall have a compressive strength of 2500 psi minimum at 28 days. Concrete in place shall be protected from freezing and moisture loss for 7 days.

2.3 MISCELLANEOUS MATERIALS

2.3.1 Precast Concrete Manholes

Precast concrete manhole risers, base sections, and tops shall conform to ASTM C 478 and be manufactured in accordance with Section 03 40 00.00 10 PLANT-PRECAST CONCRETE PRODUCTS FOR BELOW GRADE CONSTRUCTION; base and first riser shall be monolithic.

2.3.2 Gaskets and Connectors

Gaskets for joints between manhole sections shall conform to ASTM C 443. Resilient connectors for making joints between manhole and pipes entering manhole shall conform to ASTM C 923 or ASTM C 990.

2.3.3 External Preformed Rubber Joint Seals

An external preformed rubber joint seal shall be an accepted method of sealing cast iron covers to precast concrete sections to prevent ground water infiltration into sewer systems. All finished and sealed manholes constructed in accordance with paragraph entitled "Manhole Construction" shall be tested for leakage in the same manner as pipelines as described in paragraph entitled "Leakage Tests." The seal shall be multi-section with a neoprene rubber top section and all lower sections made of Ethylene Propylene Di Monomer (EPDM) rubber with a minimum thickness of 60 mils. Each unit shall consist of a top and bottom section and shall have mastic on the bottom of the bottom section and mastic on the top and bottom of the top section. The mastic shall be a non-hardening butyl rubber sealant and shall seal to the cone/top slab of the manhole/catch basin and over the lip of the casting. Extension sections shall cover up to two more adjusting rings. Properties and values are listed in the following tables:

Properties, Test Methods and Minimum Values for
Rubber used in Preformed Joint Seals

Physical Properties	Test Methods	EPDM	Neoprene	Butyl mastic
Tensile, psi	ASTM D 412	1840	2195	-
Elongation percent	ASTM D 412	553	295	350
Tear Resistance, ppi	ASTM D 624 (Die B)	280	160	-
Rebound, percent, 5 minutes	ASTM C 972 (mod.)	-	-	11
Rebound, percent, 2 hours	ASTM C 972	-	-	12

2.3.4 Metal Items

2.3.4.1 Frames, Covers, and Gratings for Manholes

Frames and covers shall be cast iron, ductile iron or reinforced concrete. Cast iron frames and covers shall be as indicated or shall be of type suitable for the application, circular, without vent holes. The frames and covers shall have a combined weight of not less than 400 pounds. Reinforced concrete frames and covers shall be as indicated or shall conform to ASTM C 478. The word "Sewer" shall be stamped or cast into covers so that it is plainly visible.

2.4 REPORTS

Submit Test Reports. Compaction and density test shall be in accordance with Section 31 00 00 EARTHWORK. Submit Inspection Reports for daily activities during the installation of the sanitary system. Information in the report shall be detailed enough to describe location of work and amount of pipe laid in place, measured in linear feet.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES AND APPURTENANT CONSTRUCTION

3.1.1 General Requirements for Installation of Pipelines

These general requirements apply except where specific exception is made in the following paragraphs entitled "Special Requirements."

3.1.1.1 Location

The work covered by this section shall terminate at a point approximately 5 feet from the building , unless otherwise indicated. Where the location of the sewer is not clearly defined by dimensions on the drawings, do not lay sewer line closer horizontally than 10 feet to a water main or service line.

Where sanitary sewer lines pass above or below water lines, construct crossing as indicated in drawings and in accordance with TCEQ requirements 30 TAC 290 and 30 TAC 217.

a. Sanitary piping installation parallel with water line:

1 Normal conditions: Sanitary piping or manholes shall be laid at least 10 feet horizontally from a water line whenever possible. The distance shall be measured edge-to-edge.

b. Installation of sanitary piping crossing a water line:

1 Normal conditions: Lay sanitary sewer piping by crossing under water lines to provide a separation of at least 18 inches between the top of the sanitary piping and the bottom of the water line whenever possible.

c. Sanitary sewer manholes: No water piping shall pass through or come in contact with any part of a sanitary sewer manhole.

3.1.1.2 Earthwork

Perform earthwork operations in accordance with Section 31 00 00 EARTHWORK.

3.1.1.3 Pipe Laying and Jointing

Inspect each pipe and fitting before and after installation; replace those found defective and remove from site. Provide proper facilities for lowering sections of pipe into trenches. Lay nonpressure pipe with the bell ends in the upgrade direction. Adjust spigots in bells to give a uniform space all around. Blocking or wedging between bells and spigots will not be permitted. Replace by one of the proper dimensions, pipe or fittings that do not allow sufficient space for installation of joint material. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Provide batterboards not more than 25 feet apart in trenches for checking and ensuring that pipe invert elevations are as indicated. Laser beam method may be used in lieu of batterboards for the same purpose. Branch connections shall be made by use of regular fittings or solvent cemented saddles as approved. Saddles for ABS and PVC composite pipe shall conform to Figure 2 of ASTM D 2680; saddles for ABS pipe shall comply with Table 3 of ASTM D 2751; and saddles for PVC pipe shall conform to Table 4 of ASTM D 3034.

3.1.1.4 Connections to Existing Lines

Obtain approval from the Contracting Officer before making connection to existing line. Conduct work so that there is minimum interruption of service on existing line.

3.1.2 Special Requirements

3.1.2.1 Installation of PVC Plastic Piping

Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" of this section and with the requirements of ASTM D 2321 for laying and joining pipe and fittings. Make joints with the gaskets specified for joints with this piping and assemble in accordance with the requirements of ASTM D 2321 for assembly of joints. Make joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

3.1.3 Concrete Work

Cast-in-place concrete is included in Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE. The pipe shall be supported on a concrete cradle, or encased in concrete where indicated or directed.

3.1.4 Manhole Construction

Construct base slab of cast-in-place concrete or use precast concrete base sections. Make inverts in cast-in-place concrete and precast concrete bases with a smooth-surfaced semi-circular bottom conforming to the inside contour of the adjacent sewer sections. For changes in direction of the sewer and entering branches into the manhole, make a circular curve in the manhole invert of as large a radius as manhole size will permit. For cast-in-place concrete construction, either pour bottom slabs and walls integrally or key and bond walls to bottom slab. No parging will be permitted on interior manhole walls. For precast concrete construction, make joints between manhole sections with the gaskets specified for this purpose; install in the manner specified for installing joints in concrete piping. Parging will not be required for precast concrete manholes. Cast-in-place concrete work shall be in accordance with the requirements specified under paragraph entitled "Concrete Work" of this section. Make joints between concrete manholes and pipes entering manholes with the resilient connectors specified for this purpose; install in accordance with the recommendations of the connector manufacturer. Where a new manhole is constructed on an existing line, remove existing pipe as necessary to construct the manhole. Cut existing pipe so that pipe ends are approximately flush with the interior face of manhole wall, but not protruding into the manhole. Use resilient connectors as previously specified for pipe connectors to concrete manholes.

3.1.5 Miscellaneous Construction and Installation

3.1.5.1 Connecting to Existing Manholes

Pipe connections to existing manholes shall be made so that finish work will conform as nearly as practicable to the applicable requirements specified for new manholes, including all necessary concrete work, cutting, and shaping. The connection shall be centered on the manhole. Holes for the new pipe shall be of sufficient diameter to allow packing cement mortar around the entire periphery of the pipe but no larger than 1.5 times the

diameter of the pipe. Cutting the manhole shall be done in a manner that will cause the least damage to the walls.

3.2 FIELD QUALITY CONTROL

3.2.1 Field Tests and Inspections

The Contracting Officer will conduct field inspections and witness field tests specified in this section. Perform field tests and provide labor, equipment, and incidentals required for testing. Be able to produce evidence, when required, that each item of work has been constructed in accordance with the drawings and specifications.

3.2.2 Tests for Nonpressure Lines

Check each straight run of pipeline for gross deficiencies by holding a light in a manhole; it shall show a practically full circle of light through the pipeline when viewed from the adjoining end of line. When pressure piping is used in a nonpressure line for nonpressure use, test this piping as specified for nonpressure pipe.

3.2.2.1 Leakage Tests

Test lines for leakage by either infiltration tests or exfiltration tests, or by low-pressure air tests. Prior to testing for leakage, backfill trench up to at least lower half of pipe. When necessary to prevent pipeline movement during testing, place additional backfill around pipe sufficient to prevent movement, but leaving joints uncovered to permit inspection. When leakage or pressure drop exceeds the allowable amount specified, make satisfactory correction and retest pipeline section in the same manner. Correct visible leaks regardless of leakage test results.

a. Infiltration tests and exfiltration tests: Perform these tests for sewer lines made of the specified materials, not only concrete, in accordance with ASTM C 969. Make calculations in accordance with the Appendix to ASTM C 969.

b. Low-pressure air tests: Perform tests as follows:

1 PVC plastic pipelines: Test in accordance with UBPPA UNI-B-6. Allowable pressure drop shall be as given in UBPPA UNI-B-6. Make calculations in accordance with the Appendix to UBPPA UNI-B-6.

3.2.2.2 Deflection Testing

Perform a deflection test on entire length of installed plastic pipeline on completion of work adjacent to and over the pipeline, including leakage tests, backfilling, placement of fill, grading, paving, concreting, and any other superimposed loads determined in accordance with ASTM D 2412. Deflection of pipe in the installed pipeline under external loads shall not exceed 4.5 percent of the average inside diameter of pipe. Determine whether the allowable deflection has been exceeded by use of a pull-through device or a deflection measuring device.

a. Pull-through device: This device shall be a spherical, spheroidal, or elliptical ball, a cylinder, or circular sections fused to a common shaft. Circular sections shall be so spaced on the shaft that distance from external faces of front and back sections will equal or exceed diameter of the circular section. Pull-through device may also be of a

design promulgated by the Uni-Bell Plastic Pipe Association, provided the device meets the applicable requirements specified in this paragraph, including those for diameter of the device, and that the mandrel has a minimum of 9 arms. Ball, cylinder, or circular sections shall conform to the following:

1 A diameter, or minor diameter as applicable, of 95 percent of the average inside diameter of the pipe; tolerance of plus 0.5 percent will be permitted.

2 Homogeneous material throughout, shall have a density greater than 1.0 as related to water at 39.2 degrees F, and shall have a surface Brinell hardness of not less than 150.

3 Center bored and through-bolted with a 1/4 inch minimum diameter steel shaft having a yield strength of not less than 70,000 psi, with eyes or loops at each end for attaching pulling cables.

4 Each eye or loop shall be suitably backed with a flange or heavy washer such that a pull exerted on opposite end of shaft will produce compression throughout remote end.

b. Deflection measuring device: Sensitive to 1.0 percent of the diameter of the pipe being tested and shall be accurate to 1.0 percent of the indicated dimension. Deflection measuring device shall be approved prior to use.

c. Pull-through device procedure: Pass the pull-through device through each run of pipe, either by pulling it through or flushing it through with water. If the device fails to pass freely through a pipe run, replace pipe which has the excessive deflection and completely retest in same manner and under same conditions.

d. Deflection measuring device procedure: Measure deflections through each run of installed pipe. If deflection readings in excess of 4.5 percent of average inside diameter of pipe are obtained, retest pipe by a run from the opposite direction. If retest continues to show a deflection in excess of 4.5 percent of average inside diameter of pipe, replace pipe which has excessive deflection and completely retest in same manner and under same conditions.

-- End of Section --

SECTION 33 40 00

STORM DRAINAGE UTILITIES

02/10

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO M 198 (2008) Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants

ASTM INTERNATIONAL (ASTM)

ASTM A 48/A 48M (2003; R 2008) Standard Specification for Gray Iron Castings

ASTM A 536 (1984; R 2009) Standard Specification for Ductile Iron Castings

ASTM B 26/B 26M (2009) Standard Specification for Aluminum-Alloy Sand Castings

ASTM C 270 (2008a) Standard Specification for Mortar for Unit Masonry

ASTM C 425 (2004; R 2009) Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings

ASTM C 443 (2005a) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets

ASTM C 478 (2009) Standard Specification for Precast Reinforced Concrete Manhole Sections

ASTM C 76 (2008a) Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe

ASTM C 877 (2008) External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections

ASTM D 1056 (2007) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber

ASTM D 1171	(1999; R 2007) Rubber Deterioration - Surface Ozone Cracking Outdoors or Chamber (Triangular Specimens)
ASTM D 1557	(2009) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³) (2700 kN-m/m ³)
ASTM D 2167	(2008) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 6938	(2008a) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Placing Pipe

SD-04 Samples

Pipe for Culverts and Storm Drains

SD-07 Certificates

Hydrostatic Test on Watertight Joints Determination of Density Frame and Cover for Gratings

Certified copies of test reports demonstrating conformance to applicable pipe specifications, before pipe is installed. Certification on the ability of frame and cover or gratings to carry the imposed live load.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. Keep a copy of the manufacturer's instructions available at the construction site at all times and follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe shall be stored in accordance with the manufacturer's recommendations and shall be discarded

if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.3.2 Handling

Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS

Pipe for culverts and storm drains shall be of the sizes indicated and shall conform to the requirements specified.

2.1.1 Concrete Pipe

Manufactured in accordance with and conforming to ASTM C 76, Class III .

2.2 MISCELLANEOUS MATERIALS

2.2.1 Concrete

Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements for 4000 psi concrete under Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE.

2.2.2 Mortar

Mortar for pipe joints, connections to other drainage structures, and brick or block construction shall conform to ASTM C 270, Type M, except that the maximum placement time shall be 1 hour. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar but in no case shall exceed 6 gallons of water per sack of cement. Water shall be clean and free of harmful acids, alkalies, and organic impurities. The mortar shall be used within 30 minutes after the ingredients are mixed with water. The inside of the joint shall be wiped clean and finished smooth. The mortar head on the outside shall be protected from air and sun with a proper covering until satisfactorily cured.

2.2.3 Precast Reinforced Concrete Manholes

Conform to ASTM C 478. Joints between precast concrete risers and tops shall be made with flexible watertight, rubber-type gaskets meeting the requirements of paragraph JOINTS.

2.2.4 Frame and Cover for Gratings

Frame and cover for gratings shall be cast gray iron, ASTM A 48/A 48M, Class 35B; cast ductile iron, ASTM A 536, Grade 65-45-12; or cast aluminum, ASTM B 26/B 26M, Alloy 356.OT6. Weight, shape, size, and waterway openings for grates and curb inlets shall be as indicated on the plans. The word "Storm Sewer" shall be stamped or cast into covers so that it is plainly visible.

2.2.5 Joints

2.2.5.1 Flexible Watertight Joints

- a. Materials: Flexible watertight joints shall be made with plastic or rubber-type gaskets for concrete pipe and with factory-fabricated resilient materials for clay pipe. The design of joints and the physical requirements for plastic gaskets shall conform to AASHTO M 198, and rubber-type gaskets shall conform to ASTM C 443. Factory-fabricated resilient joint materials shall conform to ASTM C 425. Gaskets shall have not more than one factory-fabricated splice, except that two factory-fabricated splices of the rubber-type gasket are permitted if the nominal diameter of the pipe being gasketed exceeds 54 inches.
- b. Test Requirements: Watertight joints shall be tested and shall meet test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS. Rubber gaskets shall comply with the oil resistant gasket requirements of ASTM C 443. Certified copies of test results shall be delivered to the Contracting Officer before gaskets or jointing materials are installed. Alternate types of watertight joint may be furnished, if specifically approved.

2.2.5.2 External Sealing Bands

Requirements for external sealing bands shall conform to ASTM C 877.

2.2.5.3 Flexible Watertight, Gasketed Joints

- a. Gaskets: When infiltration or exfiltration is a concern for pipe lines, the couplings may be required to have gaskets. The closed-cell expanded rubber gaskets shall be a continuous band approximately 7 inches wide and approximately 3/8 inch thick, meeting the requirements of ASTM D 1056, Type 2 A1, and shall have a quality retention rating of not less than 70 percent when tested for weather resistance by ozone chamber exposure, Method B of ASTM D 1171. Rubber O-ring gaskets shall be 13/16 inch in diameter for pipe diameters of 36 inches or smaller and 7/8 inch in diameter for larger pipe having 1/2 inch deep end corrugation. Rubber O-ring gaskets shall be 1-3/8 inches in diameter for pipe having 1 inch deep end corrugations. O-rings shall meet the requirements of AASHTO M 198 or ASTM C 443. Flexible plastic gaskets shall conform to requirements of AASHTO M 198, Type B.

2.3 HYDROSTATIC TEST ON WATERTIGHT JOINTS

2.3.1 Concrete

A hydrostatic test shall be made on the watertight joint types as proposed. Only one sample joint of each type needs testing; however, if the sample joint fails because of faulty design or workmanship, an additional sample joint may be tested. During the test period, gaskets or other jointing material shall be protected from extreme temperatures which might adversely affect the performance of such materials. Performance requirements for joints in reinforced and nonreinforced concrete pipe shall conform to AASHTO M 198 or ASTM C 443.

2.4 EROSION CONTROL RIPRAP

Provide nonerodible rock not exceeding 15 inches in its greatest dimension

and choked with sufficient small rocks to provide a dense mass with a minimum thickness of 8 inches .

PART 3 EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS, STORM DRAINS, AND DRAINAGE STRUCTURES

Excavation of trenches, and for appurtenances and backfilling for culverts and storm drains, shall be in accordance with the applicable portions of Section 31 00 00 EARTHWORK and the requirements specified below.

3.1.1 Trenching

The width of trenches at any point below the top of the pipe shall be not greater than indicated in drawings to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheet piling and bracing, where required, shall be placed within the trench width as specified, without any overexcavation. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures will be necessary. Cost of this redesign and increased cost of pipe or installation shall be borne by the Contractor without additional cost to the Government.

3.1.2 Removal of Rock

Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least 8 inches or 1/2 inch for each foot of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe. Rock excavation shall be as specified and defined in Section 31 00 00 EARTHWORK.

3.1.3 Removal of Unstable Material

Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Contracting Officer, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced to the proper grade with select granular material, compacted as provided in paragraph BACKFILLING. When removal of unstable material is due to the fault or neglect of the Contractor while performing shoring and sheet piling, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the Government.

3.2 BEDDING

The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

3.2.1 Concrete Pipe Requirements

When no bedding class is specified or detailed on the drawings, concrete pipe shall be bedded in granular material minimum 4 inch in depth in trenches with soil foundation. Depth of granular bedding in trenches with rock foundation shall be 1/2 inch in depth per foot of depth of fill, minimum depth of bedding shall be 8 inch up to maximum depth of 24 inches. The middle third of the granular bedding shall be loosely placed. Bell

holes and depressions for joints shall be removed and formed so entire barrel of pipe is uniformly supported. The bell hole and depressions for the joints shall be not more than the length, depth, and width required for properly making the particular type of joint.

3.3 PLACING PIPE

Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Plastic pipe shall be protected from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Lifting lugs in vertically elongated metal pipe shall be placed in the same vertical plane as the major axis of the pipe. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary.

Note post installation requirements of paragraph 'Deflection Testing' in PART 3 of this specification for all pipe products including deflection testing requirements for flexible pipe.

3.3.1 Concrete

Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

3.4 JOINTING

3.4.1 Concrete

3.4.1.1 Cement-Mortar Bell-and-Spigot Joint

The first pipe shall be bedded to the established grade line, with the bell end placed upstream. The interior surface of the bell shall be thoroughly cleaned with a wet brush and the lower portion of the bell filled with mortar as required to bring inner surfaces of abutting pipes flush and even. The spigot end of each subsequent pipe shall be cleaned with a wet brush and uniformly matched into a bell so that sections are closely fitted. After each section is laid, the remainder of the joint shall be filled with mortar, and a bead shall be formed around the outside of the joint with sufficient additional mortar. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint shall be wrapped or bandaged with cheesecloth to hold mortar in place.

3.4.1.2 Plastic Sealing Compound Joints for Tongue-and-Grooved Pipe

Sealing compounds shall follow the recommendation of the particular manufacturer in regard to special installation requirements. Surfaces to receive lubricants, primers, or adhesives shall be dry and clean. Sealing compounds shall be affixed to the pipe not more than 3 hours prior to installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Sealing compounds shall be inspected before installation of the pipe, and any loose or improperly affixed sealing compound shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pulled together. If, while making the joint with mastic-type sealant, a slight protrusion of the material is not visible along the entire inner and outer circumference

of the joint when the joint is pulled up, the pipe shall be removed and the joint remade. After the joint is made, all inner protrusions shall be cut off flush with the inner surface of the pipe. If non-mastic-type sealant material is used, the "Squeeze-Out" requirement above will be waived.

3.4.1.3 Flexible Watertight Joints

Gaskets and jointing materials shall be as recommended by the particular manufacturer in regard to use of lubricants, cements, adhesives, and other special installation requirements. Surfaces to receive lubricants, cements, or adhesives shall be clean and dry. Gaskets and jointing materials shall be affixed to the pipe not more than 24 hours prior to the installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Gaskets and jointing materials shall be inspected before installing the pipe; any loose or improperly affixed gaskets and jointing materials shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pushed home. If, while the joint is being made the gasket becomes visibly dislocated the pipe shall be removed and the joint remade.

3.5 DRAINAGE STRUCTURES

3.5.1 Manholes and Inlets

Construction shall be of reinforced concrete or precast reinforced concrete complete with frames and covers or gratings as indicated in drawings. Pipe connections to concrete manholes and inlets shall be made with flexible, watertight connectors.

3.5.2 Walls and Headwalls

Construction shall be as indicated.

3.6 BACKFILLING

3.6.1 Backfilling Pipe in Trenches

After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 6 inches in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation equal to the midpoint (spring line) of RCP or has reached an elevation of at least 12 inches above the top of the pipe for flexible pipe. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 12 inches. Tests for density shall be made as necessary to ensure conformance to the compaction requirements specified below. Where it is necessary, in the opinion of the Contracting Officer, that sheeting or portions of bracing used be left in place, the contract will be adjusted accordingly. Untreated sheeting shall not be left in place beneath structures or pavements.

3.6.2 Backfilling Pipe in Fill Sections

For pipe placed in fill sections, backfill material and the placement and

compaction procedures shall be as specified below. The fill material shall be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 6 inches in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less. After the backfill has reached at least 12 inches above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in layers not exceeding 12 inches. Use select granular material for this entire region of backfill for flexible pipe installations.

3.6.3 Movement of Construction Machinery

When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced.

3.6.4 Compaction

3.6.4.1 General Requirements

Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands. Cohesive materials include clayey and silty gravels, gravel-silt mixtures, clayey and silty sands, sand-clay mixtures, clays, silts, and very fine sands. When results of compaction tests for moisture-density relations are recorded on graphs, cohesionless soils will show straight lines or reverse-shaped moisture-density curves, and cohesive soils will show normal moisture-density curves.

3.6.4.2 Minimum Density

Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.

- a. Under paved roads, streets, parking areas, and similar-use pavements including adjacent shoulder areas, the density shall be not less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material, up to the elevation where requirements for pavement subgrade materials and compaction shall control.
- b. Under unpaved or turfed traffic areas, density shall not be less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material.
- c. Under nontraffic areas, density shall be not less than that of the surrounding material.

3.6.5 Determination of Density

Testing is the responsibility of the Contractor and performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to

approval. Tests shall be performed in sufficient number to ensure that specified density is being obtained. Laboratory tests for moisture-density relations shall be made in accordance with ASTM D 1557 except that mechanical tampers may be used provided the results are correlated with those obtained with the specified hand tamper. Field density tests shall be determined in accordance with ASTM D 2167 or ASTM D 6938. When ASTM D 6938 is used, the calibration curves shall be checked and adjusted, if necessary, using the sand cone method as described in paragraph Calibration of the referenced publications. ASTM D 6938 results in a wet unit weight of soil and ASTM D 6938 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D 6938. Test results shall be furnished the Contracting Officer. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed.

3.7 FIELD PAINTING

After installation, clean cast-iron frames, covers, gratings, and steps not buried in masonry or concrete to bare metal of mortar, rust, grease, dirt, and other deleterious materials and apply a coat of bituminous paint. After installation, clean steel covers and steel or concrete frames not buried in masonry or concrete to bare metal of mortar, dirt, grease, and other deleterious materials. Apply a coat of primer, to a minimum dry film thickness of 6 mil; and apply a top coat, to a minimum dry film thickness of 6 mils, color optional.

-- End of Section --

SECTION 33 51 15

NATURAL-GAS DISTRIBUTION

11/08

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN GAS ASSOCIATION (AGA)

AGA XR0603 (2006) AGA Plastic Pipe Manual for Gas Service

ASME INTERNATIONAL (ASME)

ASME B16.40 (2002; Errata 2003) Manually Operated Thermoplastic Gas Shutoffs and Valves in Gas Distribution Systems

ASME B31.8 (2007) Gas Transmission and Distribution Piping Systems

ASTM INTERNATIONAL (ASTM)

ASTM D 1598 (2002; R 2008) Time-to-Failure of Plastic Pipe Under Constant Internal Pressure

ASTM D 1599 (2005) Resistance to Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings

ASTM D 2513 (2008b) Thermoplastic Gas Pressure Pipe, Tubing, and Fittings

ASTM D 2683 (2004) Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing

ASTM D 2774 (2008) Underground Installation of Thermoplastic Pressure Piping

ASTM D 3261 (2003) Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

ASTM D 3350 (2008) Polyethylene Plastics Pipe and Fittings Materials

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS
INDUSTRY (MSS)

MSS SP-25 (2008) Standard Marking System for Valves,
Fittings, Flanges and Unions

TEXAS ADMINISTRATIVE CODE (TAC)

16 TAC §8 Pipeline Safety Regulations

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

49 CFR 191 Transportation of Natural and Other Gas by
Pipeline; Annual Reports, Incident
Reports, and Safety-Related Condition
Reports

49 CFR 192 Transportation of Natural and Other Gas by
Pipeline: Minimum Federal Safety Standards

49 CFR 193 Liquefied Natural Gas Facilities: Federal
Safety Standards

49 CFR 195 Transportation of Hazardous Liquids by
Pipeline

1.2 SYSTEM DESCRIPTION

The gas distribution system includes natural gas piping and appurtenances and including the connection to the existing system, the gas meter, and the connection to the building stubout. Submit operation and maintenance data in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

Contractors and their employees (or sub-contractors and their employees) installing, testing, or commissioning the natural gas system must be certified by the operating utility (Texas Gas Services) as outlined by the Railroad Commission of Texas Safety Division requirements, 49 CFR 192, and 16 TAC §8. Contractor Training & Testing will include contractor and their individual employees testing with written and oral examinations by the operating utility. Their work performance history and on-the-job training are also reviewed by the operating utility. Contractors installing, testing, and/or commissioning pipeline facilities are also subject to 49 CFR 191, 49 CFR 192, 49 CFR 193, or 49 CFR 195, testing all employees for the presence of prohibited drugs and alcohol.

1.2.1 Gas Distribution System and Equipment Operation

Include maps showing piping layout, locations of system valves, gas line markers and cathodic protection system test stations; step-by-step procedures for system start up, operation and shutdown (index system components and equipment to the system maps); isolation procedures including valve operation to shutdown or isolate each section of the system (index valves to the system maps and provide separate procedures for normal operation and emergency shutdown if required to be different). Submit Data Package No. 4.

1.2.2 Gas Distribution System Maintenance

Include maintenance procedures and frequency for system and equipment;

identification of pipe materials and manufacturer by locations, pipe repair procedures, and jointing procedures at transitions to other piping material or material from a different manufacturer. Submit Data Package No. 4.

1.2.3 Gas Distribution Equipment Maintenance

Include identification of valves and other equipment by materials, manufacturer, vendor identification and location; maintenance procedures and recommended tool kits for valves and equipment; recommended repair methods (i.e., field repair, factory repair, or replacement) for each valve and piece of equipment; and preventive maintenance procedures, possible failure modes and troubleshooting guide. Submit Data Package No. 3.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Pipe, Fittings, and Associated Materials

SD-03 Product Data

Materials and Equipment; G
Spare Parts; G

SD-05 Design Data

Connections to Existing Lines; G
Jointing of Polyethylene Piping; G

SD-06 Test Reports

Pressure and Leak Tests; G

Data in booklet form from all pressure tests of the distribution system.

SD-10 Operation and Maintenance Data

Gas Distribution System

Six copies, in booklet form and indexed, of site specific natural gas operation and maintenance manual for each gas distribution system including system operation, system maintenance, equipment operation, and equipment maintenance manuals described below. If operation and maintenance manuals are provided in a common volume, they shall be clearly differentiated and separately indexed.

Include, but not be limited to, the following in the System Operation Manual:

a. Drawings showing piping layout and locations of all system valves and gas line markers.

b. Step-by-step procedures required for system startup, operation, and shutdown. System components and equipment shall be indexed to the gas drawings.

c. Isolation procedures and valve operations to shut down or isolate each section of the system. Valves and other system components shall be indexed to the gas drawings.

d. Descriptions of Emergency Procedures including: isolation procedures including required valve operations with valve locations indexed to gas drawing, recommended emergency equipment, checklist for major emergencies and procedures for connecting emergency gas supply.

The Equipment Operation Manual shall include, but not be limited to, detail drawings, equipment data, and manufacturer supplied operation manuals for all equipment, valves and system components.

The System Maintenance Manuals shall include, but not be limited to:

a. Maintenance check list for entire gas distribution system.

b. Descriptions of site specific standard maintenance procedures.

c. Piping layout, equipment layout, and control diagrams of the systems as installed.

d. Identification of pipe materials and manufacturer by location, pipe repair procedures, and jointing procedures at transitions to other piping materials or piping from different manufacturer.

The Equipment Maintenance Manuals shall include but not be limited to the following:

e. Identification of valves and other equipment by materials, manufacturer, vendor identification and location.

f. Maintenance procedures and recommended maintenance tool kits for all valves and equipment.

g. Recommended repair methods, either field repair, factory repair, or whole-item replacement for each valve component or piece of equipment or component item.

h. Routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guide.

Data packages, as specified.

SD-11 Closeout Submittals

Recycled Material Content; (LEED)

LEED documentation relative to recycled content credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.4 QUALITY ASSURANCE

1.4.1 Qualifications

1.4.1.1 Jointing of Polyethylene Piping

a. Join piping by performance qualified PE joiners, qualified by a person who has been trained and certified by the manufacturer of the pipe, using manufacturer's pre-qualified joining procedures in accordance with AGA XR0603. Inspect joints by an inspector qualified in the joining procedures being used and in accordance with AGA XR0603. Welders training, qualifications and procedures, (metal and PE) includes use of equipment, explanation of the procedure, and successfully making joints which pass tests specified in AGA XR0603.

b. Submit a certificate of qualified jointing procedures, training procedures, qualifications of trainer, and training test results for joiners and inspectors. Notify the Contracting Officer at least 14 hours in advance of the date to qualify joiners and inspectors.

1.4.2 Pre-Installation Conference

1.4.2.1 Shop Drawings

Submit shop drawings, within 30 days of contract award, containing complete schematic and piping diagrams and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Show on the drawings proposed layout and anchorage of the system and appurtenances, and equipment relationship to other parts of the work including clearances for maintenance and operation.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery and Storage

Inspect materials delivered to the site for damage, and store with a minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

1.5.2 Handling

Handle pipe and components carefully to ensure a sound, undamaged condition. Take particular care not to damage pipe coating. Repair damaged coatings to original finish. Do not place pipe or material of any kind inside another pipe or fitting after the coating has been applied, except as specified in paragraph INSTALLATION. Handle plastic pipe in conformance with AGA XR0603.

1.6 EXTRA MATERIALS

Submit spare parts data for each different item of equipment and material specified, after approval of the detail shop drawings and not later than 2 months prior to the date of beneficial occupancy. Include in the data a complete list of parts and supplies, with current unit prices and source of supply.

1.7 SUSTAINABLE DESIGN REQUIREMENTS

1.7.1 Recycled Material Content

Use materials or products so that the sum of post-consumer recycled content value plus one-half of post-industrial recycled content value constitutes at least 10 percent of the total materials cost for the project.

PART 2 PRODUCTS

2.1 PIPE, FITTINGS, AND ASSOCIATED MATERIALS

Provide materials and equipment which are the standard products of a manufacturer regularly engaged in the manufacture of the products and that essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Asbestos or products containing asbestos are not allowed. Provide written verification and point of contact for a supporting service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site. Mark all valves, fittings in accordance with MSS SP-25. Submit a complete list of materials and equipment, including manufacturer's descriptive and technical literature, performance charts and curves, catalog cuts, and installation instructions, including, but not limited to the following:

- a. Fittings
- b. Piping
- c. Shut-off Valves

2.1.1 Polyethylene Pipe, Tubing, Fittings and Joints

Provide polyethylene pipe, tubing, fittings and joints conforming to ASTM D 3350 and ASTM D 2513, pipe designations PE 2406 and PE 3408, rated SDR 11 or less, as specified in ASME B31.8. Mark pipe sections as required by ASTM D 2513. Provide butt fittings conforming to ASTM D 3261 and socket fittings conforming to ASTM D 2683. Match fittings to the service rating of the pipe. Use polyethylene pipe, tubing, and fittings as recommended by the manufacturer for use with LPG. Perform underground installations in conformance with ASTM D 2774.

2.1.2 Gas Transition Fittings

Provide manufactured steel gas transition fittings approved for jointing steel and polyethylene or fiberglass pipe, conforming to AGA XR0603 requirements for transition fittings.

2.2 VALVES

2.2.1 Polyethylene Valves

Provide polyethylene valves conforming to ASME B16.40. Polyethylene valves, in sizes 1/2 inch to 6 inches, may be used with polyethylene distribution and service lines, in lieu of steel valves, for underground installation only.

PART 3 EXECUTION

3.1 EXAMINATION

After becoming familiar with all details of the work, verify all dimensions

in the field, and advise the Contracting Officer of any discrepancy before performing the work.

3.2 EXCAVATION AND BACKFILLING

Earthwork is as specified in Section 31 00 00 EARTHWORK.

3.3 GAS MAINS

Provide polyethylene pipe for gas mains. Do not install polyethylene mains aboveground.

3.4 WORKMANSHIP AND DEFECTS

Make pipe, tubing, and fittings clear and free of cutting burrs and defects in structure or threading, and thoroughly brushed and blown free of chips and scale. Do not repair, but replace defective pipe, tubing, or fittings.

3.5 INSTALLATION

Install Gas Distribution System and equipment in conformance with the manufacturer's recommendations and applicable sections of ASME B31.8, AGA XR0603 and 49 CFR 192. Do not damage pipe when cutting. Only use an approved type of mechanical cutter. Use wheel cutters where practicable. Cut plastic pipe in accordance with AGA XR0603. Design valve installation in plastic pipe to protect the plastic pipe against excessive torsional or shearing loads when the valve is operated and from other stresses which may be exerted through the valve or valve box.

3.5.1 Installing Pipe Underground

Grade gas mains and service lines as indicated. Provide mains with 36 inch minimum cover; service lines with 24 inch minimum cover; and place both mains and service lines on firmly compacted select material for the full length. Where indicated, encase, bridge, or design the main to withstand any anticipated external loads as specified in ASME B31.8. Excavate the trench below pipe grade, bed with bank sand, and compact to provide full-length bearing. Laying pipe on blocks to produce uniform grade is not permitted. Ensure that the pipe is clean inside before it is lowered into the trench and keep free of water, soil, and all other foreign matter that might damage or obstruct the operation of the valves, regulators, meters, or other equipment. When work is not in progress, securely close open ends of pipe or fittings with expandable plugs or other suitable means. Minor changes in line or gradient of pipe that can be accomplished through the natural flexibility of the pipe material without producing permanent deformation and without overstressing joints may be made when approved. Make changes in line or gradient that exceed the limitations specified with fittings. When polyethylene piping is installed underground, place foil backed magnetic tape above the pipe to permit locating with a magnetic detector. After laying of pipe and testing, backfill the trench and maintain safety precautions for all pressure testing at all times during testing.

3.6 PIPE JOINTS

Design and install pipe joints to effectively sustain the longitudinal pullout forces caused by the contraction of piping or superimposed loads.

3.6.1 Threaded Steel Joints

Provide threaded joints in steel pipe with tapered threads evenly cut, made with UL approved graphite joint sealing compound for gas service or polytetrafluoroethylene tape applied to the male threads only. Caulking of threaded joints to stop or prevent leaks is not permitted.

3.6.2 Polyethylene Pipe Jointing Procedures

Use jointing procedures conforming to AGA XR0603. Avoid making indiscriminate heat fusion joining of plastic pipe or fittings made from different polyethylene resins by classification or by manufacturer if other alternative joining procedures are available. If heat fusion joining of dissimilar polyethylene is required, special procedures are required. Test the method of heat fusion joining dissimilar polyethylene resins in accordance with paragraph TESTS, subparagraph Destructive Tests of Plastic Pipe Joints.

3.7 VALVE BOXES

Provide valve boxes of cast iron not less than 3/16 inch thick at each underground valve except where concrete or other type of housing is indicated. Provide valve boxes with locking covers that require a special wrench for removal, and furnish the correctly marked wrench for each box. Cast the word "gas" in the box cover. When the valve is located in a roadway, protect the valve box by a suitable concrete slab at least 3 square feet. When in a sidewalk, provide the top of the box as a removable concrete slab 2 feet square and set flush with the sidewalk. Make the boxes adjustable extension type with screw or slide-type adjustments. Separately support valve boxes to not rest on the pipe, so that no traffic loads can be transmitted to the pipe. Only locate valves valve boxes or inside of buildings.

3.8 CONNECTIONS TO EXISTING LINES

Make connections between new work and existing gas lines, where required, in accordance with ASME B31.8, using proper fittings to suit the actual conditions. When connections are made by tapping into a gas main, provide the same size connecting fittings as the pipe being connected.

3.8.1 Connection to Government Owned/Operated Gas Lines

Provide connections to the existing gas lines in accordance with approved procedures. Deactivation of any portion of the existing system shall only be done at the valve location shown on the drawings. Reactivation of any existing gas lines will only be done by the Government. Submitted the approved Contractor's Connection Plan prior to making any connections to existing gas lines. This plan shall include the Operating Agency's required procedures which may be obtained from Fort Bliss Department of Public Works. Furnish a certification by Fort Bliss Department of Public Works that all utility work has been satisfactorily completed. Notify the Contracting Officer, in writing, 10 days before connections to existing lines are to be made.

3.9 TESTS

3.9.1 Destructive Tests of Plastic Pipe Joints

Each day, prior to making polyethylene heat fusion joints or fiberglass

adhesive joints, make a joint of each size and type to be installed that day by each person performing joining of plastic pipe that day and destructively test. Cut at least 3 longitudinal straps from each joint. Visually examine each strap for voids or discontinuities on the cut surfaces of the joint area, deformations by bending, torque, or impact. If failure occurs, it must not initiate in the joint area. If a joint fails the visual or deformation test, the qualified joiner who made that joint is not allowed to make further field joints in plastic pipe on this job until that joiner has been retrained and re-qualified. Record the results of the destructive tests including the date and time of the tests, size and type of the joints, ambient conditions, fusion iron temperature and names of inspectors and joiners.

3.9.2 Pressure and Leak Tests

Test the system of gas mains and service lines after construction and before being placed in service, using air as the test medium. Conform testing to ASTM D 1598 and ASTM D 1599 for plastic piping. The normal operating pressure for the system is 40 psi. The test pressure is 100 psi.

- a. Prior to testing the system, blow-out, clean, and clear the interior of all foreign materials. Remove all meters, regulators, and controls before blowing out and cleaning, and reinstall after clearing of all foreign materials.
- b. Perform testing of gas mains and service lines with due regard for the safety of employees and the public during the test. Keep persons not working on the test operations out of the testing area while testing is proceeding. Perform the test on the system as a whole or on sections that can be isolated.
- c. Test joints in sections prior to backfilling when trenches will be backfilled before the completion of other pipeline sections. Continue the test for at least 24 hours from the time of the initial readings to the final readings of pressure and temperature. Do not take the initial test readings of the instrument for at least 1 hour after the pipe has been subjected to the full test pressure. Do not take initial or final readings at times of rapid changes in atmospheric conditions, and temperatures are representative of the actual trench conditions. No indication of reduction of pressure is allowed during the test after corrections have been made for changes in atmospheric conditions in conformity with the relationship $T(1)P(2)=T(2)P(1)$, in which T and P denote absolute temperature and pressure, respectively, and the numbers denote initial and final readings.
- d. During the test, completely isolate the entire system from all compressors and other sources of air pressure. Test each joint by means of soap and water or an equivalent nonflammable solution prior to backfilling or concealing any work. Secure approval of testing instruments from the Contracting Officer. Furnish all labor, materials and equipment for conducting the tests subject to inspection at all times during the tests. Maintain safety precautions for air pressure testing at all times during the tests.

-- End of Section --

SECTION 33 71 02.00 20

UNDERGROUND ELECTRICAL DISTRIBUTION - INFRASTRUCTURE

08/08

PART 1 GENERAL

1.1 Scope

This specification is applicable to both power and communication infrastructure. This section of the specifications applies to Drawing Series U-30X, U-40X, U-60X, U-61X, U-83X, and U-87X.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 318M (2008) Metric Building Code Requirements
for Structural Concrete and Commentary

ACI SP-66 (2004) ACI Detailing Manual

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO HB-17 (2002; Errata 2003; Errata 2005) Standard
Specifications for Highway Bridges

AASHTO M 198 (2008) Standard Specification for Joints
for Concrete Pipe, Manholes and Precast
Box Sections Using Preformed Flexible
Joint Sealants

ASSOCIATION OF EDISON ILLUMINATING COMPANIES (AEIC)

AEIC CS8 (2000) Extruded Dielectric Shielded Power
Cables Rated 5 Through 46 kV

ASTM INTERNATIONAL (ASTM)

ASTM B 1 (2001; R 2007) Standard Specification for
Hard-Drawn Copper Wire

ASTM B 231/B 231M (2004) Standard Specification for
Concentric-Lay-Stranded Aluminum 1350
Conductors

ASTM B 3 (2001; R 2007) Standard Specification for
Soft or Annealed Copper Wire

ASTM B 400 (2008) Standard Specification for Compact
Round Concentric-Lay-Stranded Aluminum

1350 Conductor

ASTM B 609/B 609M	(1999; R 2004) Standard Specification for Aluminum 1350 Round Wire, Annealed and Intermediate Tempers, for Electrical purposes
ASTM B 8	(2004) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM C 309	(2007) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 32	(2005) Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale)
ASTM C 478	(2009) Standard Specification for Precast Reinforced Concrete Manhole Sections
ASTM C 857	(2007) Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
ASTM F 512	(2006) Smooth-Wall Poly (Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(2007; TIA 2007-1; TIA 2007-2; TIA 2007-3; TIA 2007-4; TIA 2007-5) National Electrical Safety Code
IEEE Std 100	(2000) The Authoritative Dictionary of IEEE Standards Terms
IEEE Std 386	(2006) Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600V
IEEE Std 400.2	(2004) Guide for Field Testing of Shielded Power Cable Systems Using Very Low Frequency (VLF)
IEEE Std 404	(2006) Extruded and Laminated Dielectric Shielded Cable Joints Rated 2500 V Through 500 000 V
IEEE Std 48	(1996; R 2003) Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5 kV through 765 kV
IEEE Std 81	(1983) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System (Part 1)Normal Measurements

INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)

ICEA S-94-649 (2004) Standard for Concentric Neutral
Cable Rated 5 Through 46 KV

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS (2009) Standard for Acceptance Testing
Specifications for Electrical Power
Equipment and Systems

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA RN 1 (2005) Standard for Polyvinyl Chloride
(PVC) Externally Coated Galvanized Rigid
Steel Conduit and Intermediate Metal
Conduit

NEMA TC 6 & 8 (2003) Standard for Polyvinyl Chloride PVC
Plastic Utilities Duct for Underground
Installations

NEMA TC 9 (2004) Standard for Fittings for Polyvinyl
Chloride (PVC) Plastic Utilities Duct for
Underground Installation

NEMA WC 71 (1999) Standard for Nonshielded Cables
Rated 2001-5000 Volts for use in the
Distribution of Electric Energy

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2008; AMD 1 2008) National Electrical Code

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-758-A (2004) Customer-Owned Outside Plant
Telecommunications Cabling Standard

U.S. DEPARTMENT OF AGRICULTURE (USDA)

RUS Bull 1751F-644 (2002) Underground Plant Construction

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-60005 (Basic; Notice 1) Frames, Covers,
Gratings, Steps, Sump And Catch Basin,
Manhole

UNDERWRITERS LABORATORIES (UL)

UL 467 (2007) Standard for Grounding and Bonding
Equipment

UL 486A-486B (2003; Rev thru Apr 2009) Standard for
Wire Connectors

UL 510 (2005; Rev thru Aug 2005) Polyvinyl
Chloride, Polyethylene, and Rubber

Insulating Tape

UL 514B	(2004; Rev thru Aug 2007) Standard for Conduit, Tubing and Cable Fittings
UL 6	(2007) Standard for Electrical Rigid Metal Conduit-Steel
UL 651	(2005; R 2006 thru 2008) Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings
UL 651A	(2000; Rev thru Sep 2007) Type EB and A Rigid PVC Conduit and HDPE Conduit
UL 83	(2008) Standard for Thermoplastic-Insulated Wires and Cables

DEPARTMENT OF THE ARMY

ISEC	(2010) Installation Information Infrastructure Architecture (I3A).
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1.3 DEFINITIONS

- a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE Std 100.
- b. In the text of this section, the words conduit and duct are used interchangeably and have the same meaning.
- c. In the text of this section, "medium voltage cable splices," and "medium voltage cable joints" are used interchangeably and have the same meaning.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Precast underground structures; G

SD-03 Product Data

Medium voltage cable; G

Medium voltage cable joints; G

Medium voltage cable terminations; G

Live end caps; G

Precast concrete structures; G

Sealing Material

Pulling-In Irons

Manhole frames and covers; G

Handhole frames and covers; G

Cable supports (racks, arms and insulators); G

SD-06 Test Reports

Arc-proofing test for cable fireproofing materials; G

Medium voltage cable qualification and production tests; G

Field Acceptance Checks and Tests; G

Arc-proofing test for cable fireproofing tape; G

Cable Installation Plan and Procedure

Six copies of the information described below in 8-1/2 by 11 inch binders having a minimum of three rings from which material may readily be removed and replaced, including a separate section for each cable pull. Sections shall be separated by heavy plastic dividers with tabs, with all data sheets signed and dated by the person supervising the pull.

- a. Site layout drawing with cable pulls numerically identified.
- b. A list of equipment used, with calibration certifications. The manufacturer and quantity of lubricant used on pull.
- c. The cable manufacturer and type of cable.
- d. The dates of cable pulls, time of day, and ambient temperature.
- e. The length of cable pull and calculated cable pulling tensions.
- f. The actual cable pulling tensions encountered during pull.

SD-07 Certificates

Cable splicer/terminator; G

Cable Installer Qualifications

1.5 QUALITY ASSURANCE

1.5.1 Precast Underground Structures

Submittal required for each type used. Provide calculations and drawings for precast manholes and handholes bearing the seal of a registered professional engineer including:

- a. Material description (i.e., f'c and Fy)

- b. Manufacturer's printed assembly and installation instructions
- c. Design calculations
- d. Reinforcing shop drawings in accordance with ACI SP-66
- e. Plans and elevations showing opening and pulling-in iron locations and details

1.5.2 Certificate of Competency for Cable Splicer/Terminator

Certification of the qualification of the cable splicer/terminator shall be submitted, for approval, 30 days before splices or terminations are to be made in medium voltage (5 kV to 35 kV) cables. The certification shall include the training, and experience of the individual on the specific type and classification of cable to be provided under this contract. The certification shall indicate that the individual has had three or more years recent experience splicing and terminating medium voltage cables. The certification shall also list a minimum of three splices/terminations that have been in operation for more than one year. In addition, the individual may be required to perform a dummy or practice splice/termination in the presence of the Contracting Officer, before being approved as a qualified cable splicer. If that additional requirement is imposed, the Contractor shall provide short sections of the approved types of cables along with the approved type of splice/termination kit, and detailed manufacturer's instructions for the cable to be spliced. The Contracting Officer reserves the right to require additional proof of competency or to reject the individual and call for certification of an alternate cable splicer.

1.5.3 Cable Installer Qualifications

Provide at least one onsite person in a supervisory position with a documentable level of competency and experience to supervise all cable pulling operations. Provide a resume showing the cable installers' experience in the last three years, including a list of references complete with points of contact, addresses and telephone numbers.

1.5.4 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

1.5.5 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or

brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

1.5.5.1 Material and Equipment Manufacturing Date

Products manufactured more than 1 year prior to date of delivery to site shall not be used, unless specified otherwise.

PART 2 PRODUCTS

2.1 CONDUIT, DUCTS, AND FITTINGS

2.1.1 Rigid Metal Conduit

UL 6.

2.1.1.1 Rigid Metallic Conduit, PVC Coated

NEMA RN 1, Type A40, except that hardness shall be nominal 85 Shore A durometer, dielectric strength shall be minimum 400 volts per mil at 60 Hz, and tensile strength shall be minimum 3500 psi.

2.1.2 Plastic Conduit for Direct Burial

UL 651, Schedule 40 or Schedule 80 as indicated.

2.1.3 Plastic Duct for Concrete Encasement

NEMA TC 6 & 8 and ASTM F 512, UL 651A Type DB-120 PVC for communications and UL 651, EPC-40-PVC for power.

2.1.4 Conduit Sealing Compound

Compounds for sealing ducts and conduit shall have a putty-like consistency workable with the hands at temperatures as low as 35 degrees F, shall neither slump at a temperature of 300 degrees F, nor harden materially when exposed to the air. Compounds shall adhere to clean surfaces of fiber or plastic ducts; metallic conduits or conduit coatings; concrete, masonry, or lead; any cable sheaths, jackets, covers, or insulation materials; and the common metals. Compounds shall form a seal without dissolving, noticeably changing characteristics, or removing any of the ingredients. Compounds shall have no injurious effect upon the hands of workmen or upon materials. Inflatable bladders may be used as an option.

2.1.5 Fittings

2.1.5.1 Metal Fittings

UL 514B.

2.1.5.2 PVC Conduit Fittings

UL 514B, UL 651.

2.1.5.3 PVC Duct Fittings

NEMA TC 9.

2.2 LOW VOLTAGE INSULATED CONDUCTORS AND CABLES

Insulated conductors shall be rated 600 volts and conform to the requirements of NFPA 70, including listing requirements. Wires and cables manufactured more than 12 months prior to date of delivery to the site shall not be accepted.

2.2.1 Conductor Types

Cable and duct sizes indicated are for copper THHN/THWN conductors unless otherwise noted. Conductors No. 10 AWG and smaller shall be solid copper. Conductors No. 8 AWG and larger shall be stranded copper.

2.2.2 Conductor Material

Unless specified or indicated otherwise or required by NFPA 70, wires in conduit, other than service entrance, shall be 600-volt, Type THWN/THHN conforming to UL 83. Copper conductors shall be annealed copper complying with ASTM B 3 and ASTM B 8. Type EC/1350 is not acceptable. Intermixing of copper and aluminum conductors is not permitted.

2.2.3 In Duct

Cables shall be single-conductor cable.

2.2.4 Cable Marking

Insulated conductors shall have the date of manufacture and other identification imprinted on the outer surface of each cable at regular intervals throughout the cable length.

Each cable shall be identified by means of a fiber, laminated plastic, or non-ferrous metal tags, or approved equal, in each manhole, handhole, junction box, and each terminal. Each tag shall contain the following information; cable type, conductor size, circuit number, circuit voltage, cable destination and phase identification.

Conductors shall be color coded. Conductor identification shall be provided within each enclosure where a tap, splice, or termination is made. Conductor identification shall be by color-coded insulated conductors, plastic-coated self-sticking printed markers, colored nylon cable ties and plates, heat shrink type sleeves, or colored electrical tape. Control circuit terminations shall be properly identified. Color shall be green for grounding conductors and white for neutrals; except where neutrals of more than one system are installed in same raceway or box, other neutrals shall be white with a different colored (not green) stripe for each. Color of ungrounded conductors in different voltage systems shall be as follows

a. 480/277 volt, three-phase

- (1) Phase A - brown
- (2) Phase B - orange
- (3) Phase C - yellow

2.3 LOW VOLTAGE WIRE CONNECTORS AND TERMINALS

Shall provide a uniform compression over the entire conductor contact surface. Use solderless terminal lugs on stranded conductors.

- a. For use with copper conductors: UL 486A-486B.

2.4 MEDIUM VOLTAGE CABLE

Cable (conductor) sizes are designated by American Wire Gauge (AWG) and Thousand Circular Mils (Kcmil). Conductor and conduit sizes indicated are for copper conductors unless otherwise noted. Insulated conductors shall have the date of manufacture and other identification imprinted on the outer surface of each cable at regular intervals throughout cable length. Wires and cables manufactured more than 12 months prior to date of delivery to the site shall not be accepted. Provide single conductor type cables unless otherwise indicated.

2.4.1 Cable Configuration

Provide concentric neutral underground distribution cable conforming to ICEA S-94-649. Provide cables manufactured for use in duct applications. Cable shall be rated 15 kV with 133 percent insulation level.

2.4.2 Conductor Material

Provide concentric-lay-stranded, Class B compact round conductors. Provide aluminum alloy 1350 cables, 3/4 hard minimum complying with ASTM B 609/B 609M and ASTM B 231/B 231M for regular concentric and compressed stranding or ASTM B 400 for compacted stranding.

2.4.3 Insulation

Provide ethylene-propylene-rubber (EPR) insulation conforming to the requirements of NEMA WC 71 and ICEA S-94-649.

2.4.4 Shielding

Cables rated for 2 kV and above shall have a semiconducting conductor shield, a semiconducting insulation shield for each phase.

2.4.5 Neutrals

Concentric neutrals conductors shall be copper, having a combined ampacity equal to 1/3 of the phase conductor ampacity rating or equal to 100 percent of the phase conductor ampacity rating as indicated.

2.4.6 Jackets

Cables shall be provided with a PVC jacket.

2.5 MEDIUM VOLTAGE CABLE TERMINATIONS

IEEE Std 48 Class 1; of the molded elastomer, prestretched elastomer, or heat-shrinkable elastomer. Acceptable elastomers are track-resistant silicone rubber or track-resistant ethylene propylene compounds, such as ethylene propylene rubber or ethylene propylene diene monomer. Separable insulated connectors may be used for apparatus terminations, when such apparatus is provided with suitable bushings. Terminations, where required,

shall be provided with mounting brackets suitable for the intended installation and with grounding provisions for the cable shielding, metallic sheath, or armor. Terminations shall be provided in a kit, including: skirts, stress control terminator, ground clamp, connectors, lugs, and complete instructions for assembly and installation. Terminations shall be the product of one manufacturer, suitable for the type, diameter, insulation class and level, and materials of the cable terminated. Do not use separate parts of copper or copper alloy in contact with aluminum alloy parts in the construction or installation of the terminator.

2.5.1 Cold-Shrink Type

Terminator shall be a one-piece design, utilizing the manufacturer's latest technology, where high-dielectric constant (capacitive) stress control is integrated within a skirted insulator made of silicone rubber. Termination shall not require heat or flame for installation. Termination kit shall contain all necessary materials (except for the lugs). Termination shall be designed for installation in low or highly contaminated indoor and outdoor locations and shall resist ultraviolet rays and oxidative decomposition.

2.5.2 Separable Insulated Connector Type

IEEE Std 386. Provide connector with steel reinforced hook-stick eye, grounding eye, test point, and arc-quenching contact material. Provide connectors of the loadbreak or deadbreak type as indicated, of suitable construction for the application and the type of cable connected, and that include cable shield adaptors. Provide external clamping points and test points.

- a. 200 Ampere loadbreak connector ratings: Voltage: 15 kV, 95 kV BIL. Short time rating: 10,000 rms symmetrical amperes.
- b. 600 Ampere deadbreak connector ratings: Voltage: 15 kV, 95 kV BIL. Short time rating: 25,000 rms symmetrical amperes. Connectors shall have 200 ampere bushing interface for surge arresters as indicated.
- c. Provide one set of three grounding elbows. Grounding elbows shall be delivered to the Contracting Officer.

2.6 MEDIUM VOLTAGE CABLE JOINTS

Provide joints (splices) in accordance with IEEE Std 404 suitable for the rated voltage, insulation level, insulation type, and construction of the cable. Joints shall be certified by the manufacturer for waterproof, submersible applications. Upon request, supply manufacturer's design qualification test report in accordance with IEEE Std 404. Connectors for joint shall be tin-plated electrolytic copper, having ends tapered and having center stops to equalize cable insertion.

2.6.1 Cold-Shrink Rubber-Type Joint

Joint shall be of a cold shrink design that does not require any heat source for its installation. Splice insulation and jacket shall be of a one-piece factory formed cold shrink sleeve made of black EPDM rubber. Splice shall be packaged three splices per kit, including complete installation instructions.

2.7 LIVE END CAPS

Provide live end caps using a "kit" including a heat-shrinkable tube and a high dielectric strength, polymeric plug overlapping the conductor. End cap shall conform to applicable portions of IEEE Std 48.

2.8 TAPE

2.8.1 Insulating Tape

UL 510, plastic insulating tape, capable of performing in a continuous temperature environment of 80 degrees C.

2.8.2 Buried Warning and Identification Tape

Provide detectable tape in accordance with Section 31 00 00 EARTHWORK

2.8.3 Fireproofing Tape

Provide tape composed of a flexible conformable unsupported intumescent elastomer. Tape shall be not less than .030 inch thick, noncorrosive to cable sheath, self-extinguishing, noncombustible, and shall not deteriorate when subjected to oil, water, gases, salt water, sewage, and fungus.

2.9 PULL ROPE

Shall be plastic or flat pull line (bull line) having a minimum tensile strength of 200 pounds.

2.10 GROUNDING AND BONDING

2.10.1 Driven Ground Rods

Provide copper-clad steel ground rods conforming to UL 467 not less than 3/4 inch in diameter by 10 feet in length. Sectional type rods may be used for rods 20 feet or longer.

2.10.2 Grounding Conductors

Stranded-bare copper conductors shall conform to ASTM B 8, Class B, soft-drawn unless otherwise indicated. Solid-bare copper conductors shall conform to ASTM B 1 for sizes No. 8 and smaller. Insulated conductors shall be of the same material as phase conductors and green color-coded, except that conductors shall be rated no more than 600 volts. Aluminum is not acceptable.

2.11 CAST-IN-PLACE CONCRETE

Provide concrete in accordance with Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE. In addition, provide concrete for encasement of underground ducts with 3000 psi minimum 28-day compressive strength. Concrete associated with electrical work for other than encasement of underground ducts shall be 4000 psi minimum 28-day compressive strength unless specified otherwise.

2.12 UNDERGROUND STRUCTURES

Provide precast concrete underground structures or standard type

cast-in-place manhole types as indicated, conforming to ASTM C 857 and ASTM C 478. Top, walls, and bottom shall consist of reinforced concrete. Walls and bottom shall be of monolithic concrete construction. Locate duct entrances and windows near the corners of structures to facilitate cable racking. Covers shall fit the frames without undue play. Form steel and iron to shape and size with sharp lines and angles. Castings shall be free from warp and blow holes that may impair strength or appearance. Exposed metal shall have a smooth finish and sharp lines and arises. Provide necessary lugs, rabbets, and brackets. Set pulling-in irons and other built-in items in place before depositing concrete. Install a pulling-in iron in the wall opposite each duct line entrance. Cable racks, including rack arms and insulators, shall be adequate to accommodate the cable.

2.12.1 Cast-In-Place Concrete Structures

Concrete shall conform to Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE.

2.12.2 Precast Concrete Structures, Risers and Tops

In lieu of cast-in-place, Contractors, at their option, may provide precast concrete underground structures subject to the requirements specified below. Precast units shall be the product of a manufacturer regularly engaged in the manufacture of precast concrete products, including precast manholes.

2.12.2.1 General

Precast concrete structures shall have the same accessories and facilities as required for cast-in-place structures. Likewise, precast structures shall have plan area and clear heights not less than those of cast-in-place structures. Concrete materials and methods of construction shall be the same as for cast-in-place concrete construction, as modified herein. Slope in floor may be omitted provided precast sections are poured in reinforced steel forms. Concrete for precast work shall have a 28-day compressive strength of not less than 4000 psi. Structures may be precast to the design and details indicated for cast-in-place construction, precast monolithically and placed as a unit, or structures may be assembled sections, designed and produced by the manufacturer in accordance with the requirements specified. Structures shall be identified with the manufacturer's name embedded in or otherwise permanently attached to an interior wall face.

2.12.2.2 Design for Precast Structures

ACI 318M. In the absence of detailed on-site soil information, design for the following soil parameters/site conditions:

- a. Angle of Internal Friction (ϕ) = 30 degrees
- b. Unit Weight of Soil (Dry) = 110 pcf, (Saturated) = 130 pcf
- c. Coefficient of Lateral Earth Pressure (K_a) = 0.33
- d. Ground Water Level = 3 feet below ground elevation
- e. Vertical design loads shall include full dead, superimposed dead, and live loads including a 30 percent magnification factor for impact.

Live loads shall consider all types and magnitudes of vehicular (automotive, industrial, or aircraft) traffic to be encountered. The minimum design vertical load shall be for H20 highway loading per AASHTO HB-17.

- f. Horizontal design loads shall include full geostatic and hydrostatic pressures for the soil parameters, water table, and depth of installation to be encountered. Also, horizontal loads imposed by adjacent structure foundations, and horizontal load components of vertical design loads, including impact, shall be considered, along with a pulling-in iron design load of 6000 pounds.
- g. Each structural component shall be designed for the load combination and positioning resulting in the maximum shear and moment for that particular component.
- h. Design shall also consider the live loads induced in the handling, installation, and backfilling of the manholes or handholes. Provide lifting devices to ensure structural integrity during handling and installation.

2.12.2.3 Construction

Structure top, bottom, and wall shall be of a uniform thickness of not less than 6 inches. Thin-walled knock-out panels for designed or future duct bank entrances shall not be permitted. Quantity, size, and location of duct bank entrance windows shall be as directed, and cast completely open by the precaster. Size of windows shall exceed the nominal duct bank envelope dimensions by at least 12 inches vertically and horizontally to preclude in-field window modifications made necessary by duct bank misalignment. However, the sides of precast windows shall be a minimum of 6 inches from the inside surface of adjacent walls, floors, or ceilings. Form the perimeter of precast window openings to have a keyed or inward flared surface to provide a positive interlock with the mating duct bank envelope. Provide welded wire fabric reinforcing through window openings for in-field cutting and flaring into duct bank envelopes. Provide additional reinforcing steel comprised of at least two No. 4 bars around window openings. Provide drain sumps and covers a minimum of 12 inches in diameter and 4 inches deep for precast structures. Provide a cast iron grille type sump cover.

2.12.2.4 Joints

Provide tongue-and-groove joints on mating edges of precast components. Shiplap joints are not allowed. Design joints to firmly interlock adjoining components and to provide waterproof junctions and adequate shear transfer. Seal joints watertight using preformed plastic strip conforming to AASHTO M 198, Type B. Install sealing material in strict accordance with the sealant manufacturer's printed instructions. Provide waterproofing at conduit/duct entrances into structures, and where access frame meets the top slab, provide continuous grout seal.

2.12.3 Manhole Frames and Covers

Provide cast iron frames and covers for manholes conforming to CID A-A-60005. Cast the words "ELECTRIC" or "TELECOMMUNICATIONS" in the top face of power and telecommunications manhole covers, respectively. Communications manhole covers shall be secured with the Lockdown Lockdry Manhole Security System (A Division of Barton Southern Company) or approved equal.

2.12.4 Handhole Frames and Covers

Frames and covers of steel shall be welded by qualified welders in accordance with standard commercial practice. Steel covers shall be rolled-steel floor plate having an approved antislip surface. Hinges shall be of stainless steel with bronze hinge pin, 5 by 5 inches by approximately 3/16 inch thick, without screw holes, and shall be for full surface application by fillet welding. Hinges shall have nonremovable pins and five knuckles. The surfaces of plates under hinges shall be true after the removal of raised antislip surface, by grinding or other approved method. Communications handhole covers shall be secured with the Lockdown Lockory Manhole Security System (A Division of Barton Southern Company) or approved equal.

2.12.5 Brick for Manhole Collar

Brick shall be sewer and manhole brick conforming to ASTM C 32, Grade MS.

2.13 CABLE SUPPORTS (RACKS, ARMS, AND INSULATORS)

The metal portion of racks and arms shall be zinc-coated after fabrication.

2.13.1 Cable Racks

The wall bracket shall be 4 inches by approximately 1-1/2 inch by 3/16 inch channel steel, 48 inches long (minimum) in manholes. Slots for mounting cable rack arms shall be spaced at 8 inch intervals.

2.13.2 Rack Arms

Cable rack arms shall be steel or malleable iron and shall be of the removable type. Rack arm length shall be a minimum of 8 inches and a maximum of 12 inches.

2.13.3 Insulators

Insulators for metal rack arms shall be dry-process glazed porcelain. Insulators are not required for nylon arms.

2.14 CABLE TAGS IN MANHOLES

Provide tags for each power cable located in manholes. The tags shall be polyethylene. Do not provide handwritten letters. The first position on the power cable tag shall denote the voltage. The second through sixth positions on the tag shall identify the circuit. The next to last position shall denote the phase of the circuit and shall include the Greek "phi" symbol. The last position shall denote the cable size. As an example, a tag could have the following designation: "11.5 NAS 1-8(Phase A)500," denoting that the tagged cable is on the 11.5kV system circuit number NAS 1-8, underground, Phase A, sized at 500 kcmil.

2.14.1 Polyethylene Cable Tags

Provide tags of polyethylene that have an average tensile strength of 3250 pounds per square inch; and that are 0.08 inch thick (minimum), non-corrosive non-conductive; resistive to acids, alkalis, organic solvents, and salt water; and distortion resistant to 170 degrees F. Provide 0.05 inch (minimum) thick black polyethylene tag holder. Provide a

one-piece nylon, self-locking tie at each end of the cable tag. Ties shall have a minimum loop tensile strength of 175 pounds. The cable tags shall have black block letters, numbers, and symbols one inch high on a yellow background. Letters, numbers, and symbols shall not fall off or change positions regardless of the cable tags' orientation.

2.15 SOURCE QUALITY CONTROL

2.15.1 Arc-Proofing Test for Cable Fireproofing Tape

Manufacturer shall test one sample assembly consisting of a straight lead tube 12 inches long with a 2 1/2 inch outside diameter, and a 1/8 inch thick wall, and covered with one-half lap layer of arc and fireproofing material per manufacturer's instructions. The arc and fireproofing tape shall withstand extreme temperature of a high-current fault arc 13,000 degrees K for 70 cycles as determined by using an argon directed plasma jet capable of constantly producing and maintaining an arc temperature of 13,000 degrees K. Temperature (13,000 degrees K) of the ignited arc between the cathode and anode shall be obtained from a dc power source of 305 (plus or minus 5) amperes and 20 (plus or minus 1) volts. The arc shall be directed toward the sample assembly accurately positioned 5 (plus or minus 1) millimeters downstream in the plasma from the anode orifice by fixed flow rate of argon gas (0.18 g per second). Each sample assembly shall be tested at three unrelated points. Start time for tests shall be taken from recorded peak current when the specimen is exposed to the full test temperature. Surface heat on the specimen prior to that time shall be minimal. The end point is established when the plasma or conductive arc penetrates the protective tape and strikes the lead tube. Submittals for arc-proofing tape shall indicate that the test has been performed and passed by the manufacturer.

2.15.2 Medium Voltage Cable Qualification and Production Tests

Results of AEIC CS8 qualification and production tests as applicable for each type of medium voltage cable.

PART 3 EXECUTION

3.1 INSTALLATION

Install equipment and devices in accordance with the manufacturer's published instructions and with the requirements and recommendations of NFPA 70 and IEEE C2 as applicable. In addition to these requirements, install telecommunications in accordance with TIA-758-A, RUS Bull 1751F-644 and the Department of the Army, United States Army Information Systems Engineering Command (ISEC) Technical Criteria. Installation Information Infrastructure Architecture (I3A) 2010, Outside Plant Design and Performance Requirements (OSPDPR)2008, and Technical Guide for I3A and I3MP Grounding and Bonding 2006.

3.2 CABLE INSPECTION

Prior to installation, each cable reel shall be inspected for correct storage positions, signs of physical damage, and broken end seals. If end seal is broken, moisture shall be removed from cable prior to installation in accordance with the cable manufacturer's recommendations.

3.3 CABLE INSTALLATION PLAN AND PROCEDURE

The Contractor shall obtain from the manufacturer an installation manual or set of instructions which addresses such aspects as cable construction, insulation type, cable diameter, bending radius, cable temperature limits for installation, lubricants, coefficient of friction, conduit cleaning, storage procedures, moisture seals, testing for and purging moisture, maximum allowable pulling tension, and maximum allowable sidewall bearing pressure. The Contractor shall then perform pulling calculations and prepare a pulling plan which shall be submitted along with the manufacturers instructions in accordance with SUBMITTALS. Cable shall be installed strictly in accordance with the cable manufacturer's recommendations and the approved installation plan.

Calculations and pulling plan shall include:

- a. Site layout drawing with cable pulls identified in numeric order of expected pulling sequence and direction of cable pull.
- b. List of cable installation equipment.
- c. Lubricant manufacturer's application instructions.
- d. Procedure for resealing cable ends to prevent moisture from entering cable.
- e. Cable pulling tension calculations of all cable pulls.
- f. Cable percentage conduit fill.
- g. Cable sidewall bearing pressure.
- h. Cable minimum bend radius and minimum diameter of pulling wheels used.
- i. Cable jam ratio.
- j. Maximum allowable pulling tension on each different type and size of conductor.
- k. Maximum allowable pulling tension on pulling device.

3.4 UNDERGROUND STRUCTURE CONSTRUCTION

Provide standard type cast-in-place construction as specified herein and as indicated, or precast construction as specified herein. Horizontal concrete surfaces of floors shall have a smooth trowel finish. Cure concrete by applying two coats of white pigmented membrane forming-curing compound in strict accordance with the manufacturer's printed instructions, except that precast concrete may be steam cured. Curing compound shall conform to ASTM C 309. Locate duct entrances and windows in the center of end walls (shorter) and near the corners of sidewalls (longer) to facilitate cable racking and splicing. Covers for underground structures shall fit the frames without undue play. Steel and iron shall be formed to shape and size with sharp lines and angles. Castings shall be free from warp and blow holes that may impair strength or appearance. Exposed metal shall have a smooth finish and sharp lines and arises. Provide necessary lugs, rabbets, and brackets. Set pulling-in irons and other built-in items in place before depositing concrete.

3.4.1 Cast-In-Place Concrete Structures

Construct walls on a footing of cast-in-place concrete except that precast concrete base sections may be used for precast concrete manhole risers.

3.4.2 Precast Concrete Construction

Set commercial precast structures on 6 inches of level, 90 percent compacted granular fill, 3/4 inch to 1 inch size, extending 12 inches beyond the structure on each side. Compact granular fill by a minimum of four passes with a plate type vibrator. Installation shall additionally conform to the manufacturer's instructions.

3.4.3 Pulling-In Irons

Provide steel bars bent as indicated, and cast in the walls and floors. Alternatively, pipe sleeves may be precast into the walls and floors where required to accept U-bolts or other types of pulling-in devices possessing the strengths and clearances stated herein. The final installation of pulling-in devices shall be made permanent. Cover and seal exterior projections of thru-wall type pulling-in devices with an appropriate protective coating. In the floor the irons shall be a minimum of 6 inches from the edge of the sump, and in the walls the irons shall be located within 6 inches of the projected center of the duct bank pattern or precast window in the opposite wall. However, the pulling-in iron shall not be located within 6 inches of an adjacent interior surface, or duct or precast window located within the same wall as the iron. If a pulling-in iron cannot be located directly opposite the corresponding duct bank or precast window due to this clearance limitation, locate the iron directly above or below the projected center of the duct bank pattern or precast window the minimum distance required to preserve the 6 inch clearance previously stated. In the case of directly opposing precast windows, pulling-in irons consisting of a 3 foot length of No. 5 reinforcing bar, formed into a hairpin, may be cast-in-place within the precast windows simultaneously with the end of the corresponding duct bank envelope. Irons installed in this manner shall be positioned directly in line with, or when not possible, directly above or below the projected center of the duct bank pattern entering the opposite wall, while maintaining a minimum clear distance of 3 inches from any edge of the cast-in-place duct bank envelope or any individual duct. Pulling-in irons shall have a clear projection into the structure of approximately 4 inches and shall be designed to withstand a minimum pulling-in load of 6000 pounds. Irons shall be hot-dipped galvanized after fabrication.

3.4.4 Cable Racks, Arms and Insulators

Cable racks, arms and insulators shall be sufficient to accommodate the cables. Racks in power manholes shall be spaced not more than 3 feet apart, and each manhole wall shall be provided with a minimum of two racks. Racks in signal manholes shall be spaced not more than 16 1/2 inches apart with the end rack being no further than 12 inches from the adjacent wall. Methods of anchoring cable racks shall be as follows:

- a. Provide a 5/8 inch diameter by 5 inch long anchor bolt with 3 inch foot cast in structure wall with 2 inch protrusion of threaded portion of bolt into structure. Provide 5/8 inch steel square head nut on each anchor bolt. Coat threads of anchor bolts with suitable coating immediately prior to installing nuts.

- b. Provide concrete channel insert with a minimum load rating of 800 pounds per foot. Insert channel shall be steel of the same length as "vertical rack channel;" channel insert shall be cast flush in structure wall. Provide 5/8 inch steel nuts in channel insert to receive 5/8 inch diameter by 3 inch long steel, square head anchor bolts.
- c. Provide concrete "spot insert" at each anchor bolt location, cast flush in structure wall. Each insert shall have minimum 800 pound load rating. Provide 5/8 inch diameter by 3 inch long steel, square head anchor bolt at each anchor point. Coat threads of anchor bolts with suitable coating immediately prior to installing bolts.

3.4.5 Field Painting

Cast-iron frames and covers not buried in concrete or masonry shall be cleaned of mortar, rust, grease, dirt and other deleterious materials, and given a coat of bituminous paint.

3.5 UNDERGROUND CONDUIT AND DUCT SYSTEMS

3.5.1 Requirements

Depths to top of the conduit shall be in accordance with NFPA 70. Run conduit in straight lines except where a change of direction is necessary. Numbers and sizes of ducts shall be as indicated. Ducts shall have a continuous slope downward toward underground structures and away from buildings, laid with a minimum slope of 4 inches per 100 feet. Depending on the contour of the finished grade, the high-point may be at a terminal, a manhole, a handhole, or between manholes or handholes. Short-radius manufactured 90-degree duct bends may be used only for pole or equipment risers, unless specifically indicated as acceptable. The minimum manufactured bend radius shall be 18 inches for ducts of less than 3 inch diameter, and 36 inches for ducts 3 inches or greater in diameter. Otherwise, long sweep bends having a minimum radius of 25 feet shall be used for a change of direction of more than 5 degrees, either horizontally or vertically. Both curved and straight sections may be used to form long sweep bends, but the maximum curve used shall be 30 degrees and manufactured bends shall be used. Ducts shall be provided with end bells whenever duct lines terminate in structures.

3.5.2 Treatment

Ducts shall be kept clean of concrete, dirt, or foreign substances during construction. Field cuts requiring tapers shall be made with proper tools and match factory tapers. A coupling recommended by the duct manufacturer shall be used whenever an existing duct is connected to a duct of different material or shape. Ducts shall be stored to avoid warping and deterioration with ends sufficiently plugged to prevent entry of any water or solid substances. Ducts shall be thoroughly cleaned before being laid. Plastic ducts shall be stored on a flat surface and protected from the direct rays of the sun.

3.5.3 Conduit Cleaning

As each conduit run is completed, for conduit sizes 3 inches and larger, draw a flexible testing mandrel approximately 12 inches long with a diameter less than the inside diameter of the conduit through the conduit.

After which, draw a stiff bristle brush through until conduit is clear of particles of earth, sand and gravel; then immediately install conduit plugs. For conduit sizes less than 3 inches, draw a stiff bristle brush through until conduit is clear of particles of earth, sand and gravel; then immediately install conduit plugs.

3.5.4 Galvanized Conduit Concrete Penetrations

Galvanized conduits which penetrate concrete (slabs, pavement, and walls) in wet locations shall be PVC coated and shall extend from at least 2 inches within the concrete to the first coupling or fitting outside the concrete (minimum of 6 inches from penetration).

3.5.5 Multiple Conduits

Separate multiple conduits by a minimum distance of 2 1/2 inches or as indicated. Stagger the joints of the conduits by rows (horizontally) and layers (vertically) to strengthen the conduit assembly. Provide plastic duct spacers that interlock vertically and horizontally. Spacer assembly shall consist of base spacers, intermediate spacers, ties, and locking device on top to provide a completely enclosed and locked-in conduit assembly. Install spacers per manufacturer's instructions, but provide a minimum of two spacer assemblies per 10 feet of conduit assembly.

3.5.6 Conduit Plugs and Pull Rope

New conduit indicated as being unused or empty shall be provided with plugs on each end. Plugs shall contain a weep hole or screen to allow water drainage. Provide a plastic pull rope having 3 feet of slack at each end of unused or empty conduits.

3.5.7 Conduit and Duct Without Concrete Encasement

Provide not less than 3 inches clearance from the conduit to each side of the trench. Grade bottom of trench smooth; where rock, soft spots, or sharp-edged materials are encountered, excavate the bottom for an additional 3 inches, fill and tamp level with original bottom with sand or earth free from particles, that would be retained on a 1/4 inch sieve. The first 6 inch layer of backfill cover shall be sand compacted as previously specified. The rest of the excavation shall be backfilled and compacted in 3 to 6 inch layers. Provide color, type and depth of warning tape as specified in Section 31 00 00 EARTHWORK.

3.5.7.1 Encasement Under Roads and Structures

Under roads, paved areas, and railroad tracks, install conduits in concrete encasement of rectangular cross-section providing a minimum of 3 inch concrete cover around ducts. Concrete encasement shall extend at least 5 feet beyond the edges of paved areas and roads, and 12 feet beyond the rails on each side of railroad tracks.

3.5.8 Duct Encased in Concrete

Construct underground duct lines of individual conduits encased in concrete. Do not mix different kinds of conduit in any one duct bank. Concrete encasement surrounding the bank shall be rectangular in cross-section and shall provide at least 3 inches of concrete cover for ducts. Separate conduits by a minimum concrete thickness of 2 1/2 inches, except separate light and power conduits from control, signal, and

telecommunications conduits by a minimum concrete thickness of 3 inches. Before pouring concrete, anchor duct bank assemblies to prevent the assemblies from floating during concrete pouring. Anchoring shall be done by driving reinforcing rods adjacent to duct spacer assemblies and attaching the rods to the spacer assembly. Provide color, type and depth of warning tape as specified in Section 31 00 00 EARTHWORK.

3.5.8.1 Connections to Manholes

Duct bank envelopes connecting to underground structures shall be flared to have enlarged cross-section at the manhole entrance to provide additional shear strength. Dimensions of the flared cross-section shall be larger than the corresponding manhole opening dimensions by no less than 12 inches in each direction. Perimeter of the duct bank opening in the underground structure shall be flared toward the inside or keyed to provide a positive interlock between the duct bank and the wall of the structure. Use vibrators when this portion of the encasement is poured to assure a seal between the envelope and the wall of the structure.

3.5.8.2 Connections to Existing Underground Structures

For duct bank connections to existing structures, break the structure wall out to the dimensions required and preserve steel in the structure wall. Cut steel and extend into the duct bank envelope. Chip the perimeter surface of the duct bank opening to form a key or flared surface, providing a positive connection with the duct bank envelope.

3.5.8.3 Connections to Existing Ducts

Where connections to existing duct banks are indicated, excavate the banks to the maximum depth necessary. Cut off the banks and remove loose concrete from the conduits before new concrete-encased ducts are installed. Provide a reinforced concrete collar, poured monolithically with the new duct bank, to take the shear at the joint of the duct banks.

3.5.8.4 Partially Completed Duct Banks

During construction wherever a construction joint is necessary in a duct bank, prevent debris such as mud, and, and dirt from entering ducts by providing suitable conduit plugs. Fit concrete envelope of a partially completed duct bank with reinforcing steel extending a minimum of 2 feet back into the envelope and a minimum of 2 feet beyond the end of the envelope. Provide one No. 4 bar in each corner, 3 inches from the edge of the envelope. Secure corner bars with two No. 3 ties, spaced approximately one foot apart. Restrain reinforcing assembly from moving during concrete pouring.

3.5.8.5 Removal of Ducts

Where duct lines are removed from existing underground structures, close the openings to waterproof the structure. Chip out the wall opening to provide a key for the new section of wall.

3.6 CABLE PULLING

Test existing duct lines with a mandrel and thoroughly swab out to remove foreign material before pulling cables. Pull cables down grade with the feed-in point at the manhole or buildings of the highest elevation. Use flexible cable feeds to convey cables through manhole opening and into duct

runs. Do not exceed the specified cable bending radii when installing cable under any conditions, including turnups into switches, transformers, switchgear, switchboards, and other enclosures. Cable with tape shield shall have a bending radius not less than 12 times the overall diameter of the completed cable. If basket-grip type cable-pulling devices are used to pull cable in place, cut off the section of cable under the grip before splicing and terminating.

3.6.1 Cable Lubricants

Use lubricants that are specifically recommended by the cable manufacturer for assisting in pulling jacketed cables.

3.7 CABLES IN UNDERGROUND STRUCTURES

Do not install cables utilizing the shortest path between penetrations, but route along those walls providing the longest route and the maximum spare cable lengths. Form cables to closely parallel walls, not to interfere with duct entrances, and support on brackets and cable insulators. Support cable splices in underground structures by racks on each side of the splice. Locate splices to prevent cyclic bending in the spliced sheath. Install cables at middle and bottom of cable racks, leaving top space open for future cables, except as otherwise indicated for existing installations. Provide one spare three-insulator rack arm for each cable rack in each underground structure.

3.7.1 Cable Tag Installation

Install cable tags in each manhole as specified, including each splice. Tag wire and cable provided by this contract. Install cable tags over the fireproofing, if any, and locate the tags so that they are clearly visible without disturbing any cabling or wiring in the manholes.

3.8 CONDUCTORS INSTALLED IN PARALLEL

Conductors shall be grouped such that each conduit of a parallel run contains 1 Phase A conductor, 1 Phase B conductor, 1 Phase C conductor, and 1 neutral conductor.

3.9 LOW VOLTAGE CABLE SPLICING AND TERMINATING

Make terminations with materials and methods as indicated or specified herein and as designated by the written instructions of the manufacturer.

3.10 MEDIUM VOLTAGE CABLE TERMINATIONS

Make terminations in accordance with the written instruction of the termination kit manufacturer.

3.11 MEDIUM VOLTAGE CABLE JOINTS

Provide power cable joints (splices) suitable for continuous immersion in water. Make joints only in accessible locations in manholes or handholes by using materials and methods in accordance with the written instructions of the joint kit manufacturer.

3.11.1 Joints in Shielded Cables

Cover the joined area with metallic tape, or material like the original

cable shield and connect it to the cable shield on each side of the splice. Provide a bare copper ground connection brought out in a watertight manner and grounded to the manhole grounding loop as part of the splice installation. Ground conductors, connections, and rods shall be as specified elsewhere in this section. Wire shall be trained to the sides of the enclosure to prevent interference with the working area.

3.12 CABLE END CAPS

Cable ends shall be sealed at all times with coated heat shrinkable end caps. Cables ends shall be sealed when the cable is delivered to the job site, while the cable is stored and during installation of the cable. The caps shall remain in place until the cable is spliced or terminated. Sealing compounds and tape are not acceptable substitutes for heat shrinkable end caps. Cable which is not sealed in the specified manner at all times will be rejected.

3.13 LIVE END CAPS

Provide live end caps for single conductor medium voltage cables where indicated.

3.14 FIREPROOFING OF CABLES IN UNDERGROUND STRUCTURES

Fireproof (arc proof) wire and cables which will carry current at 2200 volts or more in underground structures.

3.14.1 Fireproofing Tape

Tightly wrap strips of fireproofing tape around each cable spirally in half-lapped wrapping. Install tape in accordance with manufacturer's instructions.

3.15 GROUNDING SYSTEMS

Provide grounding system as indicated, in accordance with NFPA 70 and IEEE C2, and as specified herein.

Noncurrent-carrying metallic parts associated with electrical equipment shall have a maximum resistance to solid earth ground not exceeding the following values:

Pad-mounted transformers without protective fences	5 ohms
Ground in manholes	5 ohms
Grounding other metal enclosures of primary voltage electrical and electrically-operated equipment	5 ohms

3.15.1 Ground Cable Crossing Expansion Joints

Protect ground cables crossing expansion joints or similar separations in structures and pavements by use of approved devices or methods of installation which provide the necessary slack in the cable across the joint to permit movement. Use stranded or other approved flexible copper cable across such separations.

3.15.2 Manhole Grounding

Loop a 4/0 AWG grounding conductor around the interior perimeter, approximately 12 inches above finished floor. Secure the conductor to the manhole walls at intervals not exceeding 36 inches. Connect the conductor to the manhole grounding electrode with 4/0 AWG conductor. Connect all incoming 4/0 grounding conductors to the ground loop adjacent to the point of entry into the manhole. Bond the ground loop to all cable shields, metal cable racks, and other metal equipment with a minimum 6 AWG conductor.

3.15.3 Fence Grounding

Fences shall be grounded with a ground rod at each fixed gate post and at each corner post. Drive ground rods until the top is 24 inches below grade. Attach a No. 4 AWG copper conductor, by exothermic weld to the ground rods and extend underground to the immediate vicinity of fence post. Lace the conductor vertically into 12 inches of fence mesh and fasten by two approved bronze compression fittings, one to bond wire to post and the other to bond wire to fence. Each gate section shall be bonded to its gatepost by a 1/8 by one inch flexible braided copper strap and ground post clamps. Clamps shall be of the anti-electrolysis type.

3.16 EXCAVATING, BACKFILLING, AND COMPACTING

Provide in accordance with NFPA 70 and Section 31 00 00 EARTHWORK.

3.16.1 Reconditioning of Surfaces

3.16.1.1 Unpaved Surfaces

Restore to their original elevation and condition unpaved surfaces disturbed during installation of duct. Preserve sod and topsoil removed during excavation and reinstall after backfilling is completed. Replace sod that is damaged by sod of quality equal to that removed. When the surface is disturbed in a newly seeded area, re-seed the restored surface with the same quantity and formula of seed as that used in the original seeding, and provide topsoiling, fertilizing, liming, seeding, sodding, sprigging, or mulching.

3.16.1.2 Paving Repairs

Where trenches, pits, or other excavations are made in existing roadways and other areas of pavement where surface treatment of any kind exists, restore such surface treatment or pavement the same thickness and in the same kind as previously existed, except as otherwise specified, and to match and tie into the adjacent and surrounding existing surfaces.

3.17 CAST-IN-PLACE CONCRETE

Provide concrete in accordance with Section .03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE for Army projects

3.17.1 Concrete Slabs for Equipment

Unless otherwise indicated, the slab shall be at least 12 inches thick, reinforced with a 6 by 6 - W2.9 by W2.9 mesh, placed uniformly 4 inches from the top of the slab. Slab shall be placed on a 6 inch thick, well-compacted gravel base. Top of concrete slab shall be approximately 4 inches above finished grade with gradual slope for drainage. Edges above

grade shall have 1/2 inch chamfer. Slab shall be of adequate size to project at least 8 inches beyond the equipment.

Stub up conduits, with bushings, 2 inches into cable wells in the concrete pad. Coordinate dimensions of cable wells with transformer cable training areas.

3.17.2 Sealing

When the installation is complete, the Contractor shall seal all conduit and other entries into the equipment enclosure with an approved sealing compound. Seals shall be of sufficient strength and durability to protect all energized live parts of the equipment from rodents, insects, or other foreign matter.

3.18 FIELD QUALITY CONTROL

3.18.1 Performance of Field Acceptance Checks and Tests

Perform in accordance with the manufacturer's recommendations, and include the following visual and mechanical inspections and electrical tests, performed in accordance with NETA ATS.

3.18.1.1 Medium Voltage Cables

Perform tests after installation of cable, splices, and terminators and before terminating to equipment or splicing to existing circuits.

a. Visual and Mechanical Inspection

- (1) Inspect exposed cable sections for physical damage.
- (2) Verify that cable is supplied and connected in accordance with contract plans and specifications.
- (3) Inspect for proper shield grounding, cable support, and cable termination.
- (4) Verify that cable bends are not less than ICEA or manufacturer's minimum allowable bending radius.
- (5) Inspect for proper fireproofing.
- (6) Visually inspect jacket and insulation condition.
- (7) Inspect for proper phase identification and arrangement.

b. Electrical Tests

- (1) Perform a shield continuity test on each power cable by ohmmeter method. Record ohmic value, resistance values in excess of 10 ohms per 1000 feet of cable must be investigated and justified.
- (2) Perform acceptance test on new cables before the new cables are connected to existing cables and placed into service, including terminations and joints. Perform maintenance test on complete cable system after the new cables are connected to existing cables and placed into service, including existing cable,

terminations, and joints. Tests shall be very low frequency (VLF) alternating voltage withstand tests in accordance with IEEE Std 400.2. VLF test frequency shall be 0.05 Hz minimum for a duration of 60 minutes using a sinusoidal waveform. Test voltages shall be as follows:

CABLE RATING AC TEST VOLTAGE for ACCEPTANCE TESTING

5 kV	10kV rms (peak)
8 kV	13kV rms (peak)
15 kV	20kV rms (peak)
25 kV	31kV rms (peak)
35 kV	44kV rms (peak)

CABLE RATING AC TEST VOLTAGE for MAINTENANCE TESTING

5 kV	7kV rms (peak)
8 kV	10kV rms (peak)
15 kV	16kV rms (peak)
25 kV	23kV rms (peak)
35 kV	33kV rms (peak)

3.18.1.2 Grounding System

a. Visual and mechanical inspection

Inspect ground system for compliance with contract plans and specifications

b. Electrical tests

Perform ground-impedance measurements utilizing the fall-of-potential method in accordance with IEEE Std 81. On systems consisting of interconnected ground rods, perform tests after interconnections are complete. On systems consisting of a single ground rod perform tests before any wire is connected. Take measurements in normally dry weather, not less than 48 hours after rainfall. Use a portable megohmmeter tester in accordance with manufacturer's instructions to test each ground or group of grounds. The instrument shall be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground rod or grounding systems under test.

3.18.2 Follow-Up Verification

Upon completion of acceptance checks and tests, the Contractor shall show by demonstration in service that circuits and devices are in good operating condition and properly performing the intended function. As an exception to requirements stated elsewhere in the contract, the Contracting Officer shall be given 5 working days advance notice of the dates and times of checking and testing.

-- End of Section --